TIME INTERVAL OF MAXIMAL MAGNITUDE TO VECTOR-LOOP-END OF THREE-DIMENSIONAL VECTORCARDIOGRAPHY PREDICT CRT-RESPONSE

J. BRANDL[1], W. Koglek[1], T. Schau[2], G. Grimm[1], C. Butter[2]

[1]II. Medical Department Landeskrankenhaus, Klagenfurt, AUSTRIA, [2]Heart Center Brandenburg, Bernau/Berlin, GERMANY

Introduction: CRT is an accepted treatment for congestive heart failure, but a substantial number of patients to not respond to therapy. LBB, QRS width and echocardiographic measurements are parameters for indication, but they are not valid to predict hemodynamic response. A new method using vector ECG analysis may help to identify responders and non-responders to CRT.
Methods: Vectorcardiography data were prospectively recorded prior to CRT implantation in a series of 65 patients (47male, 65.3years, QRS width157ms±22.9, EF22.7%, LVEDD72.2mm). The vector area was calculated from VCG. The time interval (TI) between maximal vector magnitude (begin isovolumetric contraction, ICT) and the end of the loop area were measured. The TI value was correlated with the results of hemodynamic measured response of CRT. Invasive hemodynamic parameters, contractility (dp/dt) and pulse pressure (PP) were obtained after CRT implantation. Positive response to CRT was defined as an increase in dp/dtmax>10% and PP>5%, excellent response at dp/dt>20% and PP>10%.
Results: 14 patients (21%) were non-responder, measured by invasive hemodynamic parameters. The TI of these non-responders was found to be <65 ms. The quality criteria of TI as a diagnostic test to predict were: sensitivity 79%, specifity 96%, positive predictive value 85%, negative predictive value 94%. Responders to CRT-implantation have a typical slow depolarisation pattern after ICT onset. Excellent responders to CRT are found to have a TI>90 ms.
Conclusion: The TI is a new method based on vector area calculation after ICT onset. It is a useful diagnostic test to estimate the response or non-response of CRT implantation. At a negative test result of TI the likelihood of non-response can be calculated to 85%. This leads to the hypothesis that availability of great areas of late electrical excitation and/or slow depolarisation speed after begin of ICT will predict better response on CRT implantation.

RETROSPECTIVE COMPARISON OF AV OPTIMIZATION METHODS FOR CARDIAC RESYNCHRONIZATION THERAPY

W. KOGLEK[1], J. Brandl[1], R. Achleitner[2], S. Oblin[2], G. Grimm[1]

[1]II. Medical Department Landeskrankenhaus, Klagenfurt, AUSTRIA, [2]Cardiology Krankenhaus Hitzing, Wien, AUSTRIA

Introduction: In clinical practice there are many techniques for optimizing AV-delays (AVD) during CRT, most of them are time consuming. A simple method is the approximate adjustment of the AVD based on surface-ECG. The purpose of this abstract is the retrospective comparison of the surface ECG algorithm with the echo based algorithm for optimizing mitral inflow (Ritter method). The optimum AVD is given if at the end of left atrial contraction the mitral valve is closed by the ventricular pressure increase (onset isovolumetric contraction, ICT).
Methods: Atrial conduction time can be defined from atrial stimulus, or beginning P-wave to the end of P-wave (EP). Beginning of ICT corresponds to the peak/nadir of the paced QRS-complex. The time from EP to the peak/nadir of the R-wave was measured in 100 normal individuals. An age-related average value of 100ms was determined, which serve as a physiologic reference. The approximated optimum AVD is given if the delay from EP to the ICT amounts to 100ms. Thus, the optimum AVD for sensed and paced P waves can be calculated through a simple formula: [AVDopt = AVDprog + 100 - T] AVDopt = optimized AVD; AVDprog = programmed AVD at baseline; T = interval EP to peak/nadir of paced QRS; 100ms physiologic reference. 83 patients (69±9y, 57m, (QRS 129±18ms, LVEF 36±11%, LVEDD 59±8mm, at follow-up) with implanted CRT devices underwent AVD optimization (Ritter method) during each follow up. 12 lead ECG from all patients were retrospectively analysed, by measuring the distance from EP to peak/nadir of the paced QRS complex.
Results: Echocardiography optimized AVD compared with surface ECG-AVD method showed a statistically significant correlation (P<0.01). Mean interval from EP to peak/nadir of the paced QRS-complex were found to be 103±7ms.
Conclusion: The approximate AVD adjustment with the surface ECG appears to be a viable technique.

CONTRACTILITY-BASED OPTIMIZATION OF CRT DEVICES: FEASIBILITY OF A NEW AUTOMATIC ALGORITHM

S. ORAZI[1], L. Padeletti[2], A. Boncompagni[3], P. Ritter[4]

[1]Ospedale Civile, Division of Cardiology, Rieti, ITALY, [2]AO Universitaria Careggi, Division of Cardiology, Florence, ITALY, [3]Sorin Group, Milan, ITALY, [4]Inparys, Division of Cardiology, Saint Cloud, FRANCE

Introduction: Customizing the VV and AV delays (VVD and AVD) in order to optimize the hemodynamic in cardiac resynchronization therapy (CRT) patients (pts) might improve their clinical outcome. Previous studies demonstrated that VVD and AVD determined by Peak Endocardial Acceleration (PEA) signal correspond to the same indicated by echo and LV dP/dt. The authors aimed to evaluate the performance of a new automatic algorithm in determining the optimal VVD (OVVD) and AVD (OAVD) through PEA signal measurements.
Methods: The study gathered 55 pts with currently approved CRT indications (31 M, 72.7±13.9 yrs, NYHA class 3.1±0.3), implanted with a CRT pacemaker (NewLivingCHF, Sorin Group), connected to a right ventricular lead equipped with PEA sensor. The automatic optimization algorithm was launched at M0, then at M3 and M6 FUs. 9 VV configurations are tested: L+R: (LV; LR48ms; LR24ms); BiV-simult: (LR12ms; BiV0ms; RL12ms); R+L: (RL24ms; RL48ms; RV). To determine the OAVD, an AVD scan (11 steps, from 20ms to [PR-30]ms) was automatically launched, in both sinus driven and atrial paced conditions.
Results: All pts could be optimized at one FU at least. The full automatic CRT optimization (OAVD+OVVD) was feasible in more than 80% of cases at each FU (M0 80.4%; M3 86.8%; M6 81.8%). The OVVD was BiV-simult in 55%/62% of cases at M0/M3 respectively, whereas at M6 the OVVD was L+R in 41%, and R+L in 27% of cases. The OAVD trend was mainly to decrease between M0 & M3 FUs (47% of cases vs 33% stable & 20% increase), and mainly stable between M3 & M6 FUs (45% of cases vs 33% increase & 22% decrease).
Conclusions: These findings confirm the feasibility of the proposed contractility-based algorithm to fully and automatically optimize CRT devices. This method is fast, operator-independent, and potentially cost-effective vs alternative techniques. Long-term clinical data are needed to support its routine clinical use.

OXIDATIVE STRESS AND ACTIVITY OF ANTIOXIDANT ENZYMES IN PATIENTS WITH HEART FAILURE TREATED BY CARDIAC RESYNCHRONIZATION PACING

W. KRUPA[1], M. Rozwodowska[2], S. Sielski[1], A Wozniak[2], T. Fabiszak[1], J Kubica[1], G. Drewa[2]

[1]Department of Cardiology and Internal Medicine, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland, [2]Deparment of Medical Biology, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland

One of the most important process to progress heart failure is an inflammation and oxidative stress induced by former one. Cardiac resynchronization therapy (CRT) is a pacing method of treatment patients with symptomatic chronic heart failure despite optimal medical therapy. The aim of our study was assessment an oxidative stress and activity of antioxidant enzymes in patients treated by CRT. We studied 17 patients with heart failure and indications of CRT. Aetiology of disease was an ischemic (7 pts.), and non-ischemic (10 pts.) cardiomyopathy. We implanted 12 CRT pacemakers and 5 CRT defibrillators. Oxidative stress was measured by concentration of substances reacting with tiobarbituric acid (TBARS) in plasma samples. The antioxidant level was essayed by catalase (CAT), superoxide dismutase (SOD) and glutathione peroxidase (GPx) enzymes activities in erythrocytes. Samples of blood was taken before implantation and 6 months after implantation. The mean percentage of biventricular pacing after6 months was 99.29%. We observed improvement of symptoms of heart failure in 16 patients (history, 6 minute walking test) and deterioration in 1 patient. LVEF increased from 22±5% to 33±7% ($p<0.05$). Oxidative stress measured by TBARS concentration (nmolMDA/ml) in plasma was decreased after 6 months follow-up: from 0.53±0.16 before implantation to 0.41±0.1 ($p<0.05$). The activities of antioxidant enzymes CAT and SAD was statistically decreased ($p<0.05$) after 6 month observation: CAT (IU/gHb) from 69,86 ± 12,32 before CRT to 50,78 ± 16,01 6 months after CRT; SOD (U/gHb) from 1118,07 ± 161.5 to 1001.96±170.58. The activity of GPx (U/gHb) decrease also from 10.92±8.06 to 8.72±8.26 but without statistically significance ($p>0.05$).

Cardiac resynchronization pacing reduce oxidative stress in patients treated by this technique. The activity of antioxidant enzymes significantly decrease after CRT.

A NEW ALGORITHM FOR AUTOMATIC ATRIAL THRESHOLD MEASUREMENT. RESULTS OF THE CYLOS 990 MASTER STUDY

L. BINNER[1], J. Bodky[2], M. Maunz[3], I. Szendey[4], A. Steiner[5]

[1]University of Ulm - Medical Clinic II, Ulm, GERMANY, [2]Cardiac Cath Lab, Hof, GERMANY, [3]General Hospital - Department of Internal Medicine, Kirchheim/Teck, GERMANY, [4]Clinic Maria Hilf - Department of Internal Medicine, Moenchengladbach, GERMANY, [5]Biotronik Co., Berlin, GERMANY

Today, two algorithms for automatic atrial threshold measurement either using the detection of the evoked response signal or observing the patients intrinsic signal are in clinical use. Both algorithms are based in the software of the particular devices. The new "Automatic Atrial Threshold Testing" algorithm (AATT) offered by the Cylos 990 dual chamber pacemakers uses also the intrinsic signal, however, it is incorporated in the programming device. During the prospective multicentric Cylos 990 Master study AATT was evaluated. A total of 120 patients (66 female, mean age 73±10 years) either undergoing primary implantation or having generator replacement were included. Manual atrial threshold measurement by continuously lowering pacemaker output as well as automatic threshold testing by AATT were performed before hospital discharge (PHD) and one and 3 months after implantation. **Results:**

	PHD	1-Month Follow-up	3-Month Follow-up
Manual measurement	0.64 V±0.43 V	0.72 V±0.40 V	0.68 V±0.34 V
AATT	0.59 V±0.38 V	0.70 V±0.38 V	0.68 V±0.32 V
Number of patients	N = 86	N = 77	N = 61

Atrial threshold could be determined successfully by AATT in 234/314 measurements (70.1%). Reasons for unsuccessful testing were atrial flutter or fibrillation in 25 cases, retrograde AV-conduction or missing intrinsic atrial activity. No significant difference in atrial threshold measurement either performed manually or by means of AATT could be detected at any follow-up.

Conclusion: In patients with preserved intrinsic atrial activity AATT allows appropriate automatic atrial threshold determination, thus facilitating follow-up procedure.

Catheter Ablation of Ventricular Tachycardia

INTEGRATION OF MR IMAGES TO GUIDE LEFT VENTRICULAR SUBSTRATE MAPPING: FEASIBILITY AND CLINICAL APPLICABILITY IN HUMANS

C. PANDOZI[1], S. Dottori[2], S. Ficili[1], M. Galeazzi[1], C. Lavalle[1], F. Venditti[1], M. Russo[1], A. Pandozi[1], G.S. Camastra[3], G. Ansalone[3], M. Santini[1]

[1]Department of Cardiology, San Filippo Neri Hospital, Rome, ITALY, [2]Biosense Webster Italy, Johnson & Johnson Medical, Milan, ITALY, [3]Department of Cardiology, Madre Giuseppina Vannini Hospital, Rome, ITALY

Purpose: We compared the accuracy of different registration strategies (named as I, II, III, IV) to superimpose 3D magnetic resonance (MR) images with real-time electroanatomic maps of the aorta (AO) and left ventricle (LV). Furthermore, we tested its clinical utility in complete LV volume reconstruction and scar area detection.

Materials and methods: 16 patients with ischemic or idiopathic cardiomiopaty underwent a delayed-enhanced MR (DE-MR) and an electroanatomic mapping (EAM) procedure. Not-gated MR data were imported into the CartoTM EAM mapping system (Biosense Webster, Inc., Diamond Bar, CA, USA) by using the CartoMergePlusTM Module Software. After finding the most accurate registration strategy (phase 1 study, 6 patients), its clinical applicability in guiding LV substrate mapping was tested (phase 2 study, 10 patients). Single (I, II) and co-registration strategies (III, IV) were based on complete or partial (limited number of widely distributed sampled points) Carto maps, respectively. In phase 1 study, the accuracy error d was evaluated for each registration strategy.

In phase 2 study, the substrate maps were projected on the matched MR surfaces and divided into 17 regions, which were assigned to corresponding MR regions. LV end-diastolic volume (LVEDV) and localization of scar area obtained by Carto were compared to the gold standard MR analysis.

Results: Phase 1. Using the co-registration strategy III (complete AO and partial LV maps), the AO registration accuracy was 1.77±0.2 mm, with no difference with single registration strategy I (complete AO map), and partial LV registration accuracy was 2.68±0.3 with no difference with single registration strategy II (partial LV map).

Phase 2. LVEDV derived from Carto map was not significantly different compared with MR (259.9±71.6ml vs 276.9±76.2 ml; r2=0.92, P=NS)

Bipolar voltage maps analysis (cut-off<1.5 mV) showed a good correlation with DE-MR analysis of transmural/subendocardial scar localization (21 vs 24 segments; r2=0.87, P=NS).

Conclusion: The optimal registration strategy was the co-registration strategy III. The clinical utility of this technique consists on guiding the catheter roving inside the chamber, mapping of all area of the LV and optimizing scar reconstruction.

PRACTICABILITY AND FLUOROSCOPY TIMES IN SUCCESSFUL VS UNSUCCESSFUL MAGNETIC GUIDED ABLATION OF PREMATURE ECTOPY ARISING FROM THE OUTFLOW TRACT ANATOMY

M. SCHNEIDER[1], A. Schade[2], A. Langbein[2], M. Koller[2], H. Neuser[2], R. Simeoni[1], B. Schumacher[2]

[1]Cardiology/Electrophysiology Klinikum Pforzheim, Pforzheim, GERMANY, [2]Center of Cardiovascular Medicine, Bad Neustadt/ Saale, GERMANY

Idiopathic ventricular outflow tract (OT) ectopy arises from the right ventricular (RVOT), the left ventricular (LVOT) outflow tract or the bulbus aortae (BA). Extensive mapping procedures may be necessary to define the appropriate ablation area. A remote controlled magnetic ablation system (MAS; Niobe II, Stereotaxis) enables complex positioning of a flexible ablation catheter.

Study aim: In 19 patients (age 50±17y., male 13, EF 60±10%), the performance of the MAS was assessed to eliminate ventricular ectopy in the complete OT anatomy.

Methods: Pivoted permanent magnets produce a field strength of 0.08 Tesla to steer a magnet tip ablation catheter. Catheter manoeuvrability is completely remote controlled by magnet vector adjustment and a joystick controlled motor drive. 3D CARTO mapping is implemented into the MAS. A 63 cm 8.5F sheath proceeded to the tricuspid valve enables RVOT mapping while the LVOT and BA are reached using a retrogradely advanced 81 cm sheath. The initial mapping approach was chosen according surface ECG criteria.

Results: The performed mapping sequences were RVOT 8x (42%), LVOT 3x (16%), RVOT-LVOT-BA 3x, LVOT-RVOT-LVOT 2x (11%), RVOT-LVOT 1x (5%), LVOT-RVOT 1x, RVOT-LVOT-RVOT 1x. Total success (S+) was 13/19 (68%) with accomplished ablation in RVOT 8/9 (89%), LVOT 3/7 (43%) and BA 2/3 (67%). Total procedure times were 186±47 (S+) and 212±78 min (S- [n.s.]). Fluoroscopy time did not differ between S(+) and S(-) procedures (10.5±8.0 vs 11.1±6.8 min). At S(+) ablation sites the local activation time to onset surface QRS measured -43±27 vs -22±7 msec (S- [n.s.]). In 10/12 (S+) procedures a promising ablation site could be confirmed by pace mapping ($p<0.05$). No complications occurred.

Conclusions: The remote controlled MAS enables complex and intensive mapping of ventricular ectopy in the complete OT anatomy. Fluoroscopy times remain moderate even if ablation cannot be successfully accomplished.

STRATEGIES TO PREVENT PHRENIC NERVE INJURY DURING EPICARDIAL ABLATION

L. DI BIASE[1], G. Pelargonio[2], A. Dello Russo[2], P. Santarelli[2], R. Horton[3], J. Sanchez[3], J.G. Gallinghouse[3], J.D. Burkhardt[3], A. Al-Ahmad[4], P. Wang[4], S. Hao[5], R. Hongo[5], S. Beheiry[5], G. Tomassoni[6], A. Natale[3]

[1]Texas Cardiac Arrhythmia Institute St Davids Medical Center, University of Texas, University of Foggia, Foggia, Italy, Austin, USA, [2]Catholic University, Rome, ITALY, [3]Texas Cardiac Arrhythmia Institute, Austin, USA, [4]Stanford University, Palo Alto, USA, [5]Sutter Pacific Hospital, San Francisco, USA, [6]Central Baptist Hospital, Lexington, USA

Introduction: The vicinity of the phrenic nerve (PN) to the cardiac tissue relevant to arrhythmias may prevent successful ablation during epicardial procedures.

Strategies to avoid PN injury in the pericardial space is limited to shielding with a balloon which requires additional access and could be difficult to place.

Methods: 7 consecutive patients referred for epicardial ablation of arrhythmias were enrolled in this study. Endocardial and epicardial access was obtained in all patients.

A 3-D mapping system was used to guide mapping and ablation. All patients underwent epicardial catheter ablation. Pacing via the ablation catheher identified the left phrenic nerve. In order to prevent PNI, 4 new strategies were tested in each patients.

We sought to increase the distance between the epicardium and the phrenic nerve introducing 1) fluid in steps of 60 ml, till the blood pressure drop below 70 mmHg; 2) Air injection; 3) fluids infusion followed by air injection, respectively, to achieve a "controlled" progressive hydropneumopericardium; 4) Placement of a peripheral balloon between the nerve and the myocardium.

Results: At each step, epicardial pacing was performed to assess phrenic nerve stimulation.

Differences with each strategy are summarized in the table.

Conclusion: Controlled and progressive inflation of air and fluids together with a careful monitoring of the haemodynamic parameters seems to

be the best strategy to prevent PN injury during epicardial ablation. Placement of a balloon appeared difficult in most patients.

Patients	Arrhythmias	Stategy to prevent PNI			
		Fluid only	Air only	Air + Fluid	Balloon
1	VT normal heart	F	F	S	NA
2	VT normal heart	F	F	S	F
3	VT normal heart	F	F	S	NA
4	VT normal heart	F	S	S	F
5	Inappropriate Sinus Tachycardia	F	F	S	S
6	Ischemic Cardio-myopathy VT	F	F	S	F
7	Dilated Cardio-myopathy VT	F	S	S	F

F = failure to prevent phrenic nerve capture
S = success to prevent phrenic nerve capture
NA = not available

CATHETER ABLATION OF ARRHYTHMIC STORM TRIGGERED BY MONOMORPHIC ECTOPIC BEATS IN PATIENTS WITH CORONARY ARTERY DISEASE

P. PEICHL, M. Kozeluhova, R. Cihak, V. Vancura, J. Kautzner

Department of Cardiology, IKEM, Prague, CZECH REPUBLIC

Introduction: Polymorphic ventricular tachycardias/ventricular fibrillation (pVT/VF) in patients with coronary artery disease (CAD) can be triggered by monomorphic ventricular ectopic beats and thus, amenable to catheter ablation. Our goal was to analyze our experience with catheter ablation of arrhythmic storms caused by focally-triggered pVT/VF.
Methods: Between 2006 and 2008, catheter ablation of arrhythmic storm caused by focally-triggered pVT/VF was performed in 9 patients (mean age 62±7 years, 2 females). All patients had previous myocardial infarction (interval of 3days to 171months). Arrhythmic storm occurred either early after infarction (within one month, group 1, n=5) or remotely (more than one month, group 2, n=4). Mean left ventricular ejection fraction was 25±7%. All patients presented with repeated runs of pVT/VF, triggered by monomorphic ventricular ectopy. In 4/9 (44%), monomorphic VTs were also noted.
Results: Based on mapping data, the ectopic beats originated from interventricular septum (n=7), inferior wall (n=1), lateral wall (n=1). The ectopic QRS duration ranged from 120 to 200ms and was longer in group 2 (162±21ms vs 130±12ms, $p<0.05$). The coupling interval of ectopic beats was also longer in group 2 (430±30ms vs 360±35ms, $p<0.05$). Catheter ablation was performed to abolish the triggering ectopy and to modify the arrhythmogenic substrate by linear lesions within the infarct border zone. The ablation procedure was acutely successful in 8/9 patients. During the follow-up, two patients from group 1 died due to progressive heart failure. One patient from group 2 had late recurrence of arrhythmic storm due to ectopic beats of different morphology, and was successfully re-ablated.
Conclusion: Arrhythmic storm may occur both in subacute phase of myocardial infarction and late after. Catheter ablation of ectopic beats triggering pVT/VF can successfully abolish arrhythmic storm and become live-saving procedure.

VENTRICULAR TACHYCARDIA INDUCIBILITY AFTER RADIOFREQUENCY ABLATION AFFECTS THE OUTCOMES OF PATIENTS: THE ROLE OF LEFT VENTRICULAR FUNCTION

A. Colella[1], M. GIACCARDI[2], R. Molino Lova[2], C. Liccardi[1], G.F. Gensini[1]

[1]Dept. Heart and Vessels-AOU Careggi, Firenze, ITALY, [2]Dept. Cardiovascular Rehabilitation, Don Gnocchi Foundation, Firenze, ITALY

Background: Previous studies have shown that poor left ventricular function is a strong independent predictor of recurrent VTs. We hypothesized that inducibility of the VT responsible for ICD therapies at the end of RFCA, would also be associated with a differential risk, depending on left ventricular function. To investigate predictors of recurrent ventricular tachycardias (VTs) in patients with implantable cardioverter-defibrillators (ICDs) also undergone radiofrequency catheter ablation (RFCA).
Methods: We retrospectively studied 46 patients (37 men and 9 women, mean age 63±7 years) with previous myocardial infarction and with ICD who also underwent RFCA for recurrent refractory VTs.
Results: During the follow-up (29±13 months) only 15 patients (33%) showed VTs. Further, in these patients, ICD therapies dropped from 5.9±3.2, before the RFCA, to 2.6±2.0, after ($p<0.001$). Among patients with ejection fraction (EF)<35%, 8 out of 18 still continued to have VT recurrences, independent of the inducibility of the VT. Among patients with EF>35% and <50%, no recurrent VT was any longer detected in the 6 patients in whom the VT was not inducible, while VT recurrences still continued only in the 7 patients in whom it was. Finally, all the 15 patients with EF>50% did not show any recurrent VT.
Conclusions: Our findings confirm the role of RFCA in reducing ICD therapies and also place RFCA in the overall clinical management of recurrent post infarction VTs according to the left ventricular function.

RADIOFREQUENCY ABLATION OF VERY FREQUENT VENTRICULAR PREMATURE BEATS BY ELECTRONATOMIC MAPPING: A PRELIMINARY EXPERIENCE

M. RUSSO[1], M. Galeazzi[1], S. Ficili[1], C. Lavalle[1], S. Dottori[2], F. Venditti[1], A. Pandozi[1], C. Pandozi[1], M. Santini[1]

[1]San Filippo Neri Hospital, Rome, ITALY, [2]Biosense-Webster Italy, Rome, ITALY

Purpose: Very frequent ventricular premature beats (VPB) can be highly symptomatic and disabling and might result in left ventricular (LV) disfunction. Several reports (mainly case report) showed effectiveness of VPB ablation in patients (pts) with LV disfunction. We sought to determine the effectiveness and safety of electroanatomic mapping (EAM) guided ablation, in pts with disabling VPB and without LV disfunction.
Methods: From 2008, January to September, we evualuated 7 consecutive pts (4 males) with disabling VPB, very frequent at Holter (48000 to 14000 per day, mean 28509±13794). Mean age was 45±17 years. All pts had normal echocardiographic parameters (two had normal cardiac resonance) and underwent electrophysiological study with EAM (voltage and activation map) of the right (right bundle branch block VPB) or left ventricle (left bundle branch block VPB) by CartoXP® (Biosense-Webster Inc. USA). After earliest activation site was identified we delivered radiofrequency by 4 mm Navistar catheter (Biosense Webster) for 2 minutes. Success was defined as disappearance of VPB both at baseline and after isoprenaline for 30 minutes. The day after all the pts underwent Holter monitoring.
Results: Sustained ventricular arrhythmias were never induced. Six pts had VPB focus in right outflow tract, one in left ventricle. A mean of 47±20 EAM points were acquired. Success was achieved in 6 pts with 1 failure (RVOT focus). One pt developed a different VPB focus after ablation and was successfully treated one month later. At post-procedural Holter, VPB were significantly reduced (9739±16596 vs. 28509±13794, $p=0.00281$). Symptoms disappeared in pts successfully treated. No complications were observed. All the pts were discharged without antiarrhythmic drugs.
Conclusions: Ablation of disabling VPB guided by EAM is reliable, effective and safe also in patients without LV disfunction. Larger studies and prolonged follow-up are warranted in order to offer ablation as first line therapy for frequent VPB.

ATRIAL FIBRILLATION ABLATION IN PATIENTS WITH COMBINATION OF ORAL AND PARENTERAL ANTICOAGULANTS

E. MIKHAYLOV, S. Gureev, N. Sviridova, YU. Miller, N. Dmitrievskaya, E. Yakovleva, V. Marinin, V. Orshanskaya, D. Lebedev

Almazov Heart, Blood and Endocrinology Centre, Saint-Petersburg, RUSSIA

Despite of broad distribution of atrial fibrillation (AF) ablation, there is no standard approach to periprocedural anticoagulation.
Purpose: To perform retrospective analysis of AF ablation complications in patients with anticoagulation using coumadin and heparin admistration during ablation.
Methods: Oral anticoagulation was given in 310 patients at least 1 month before procedure with INR maintained between 2 and 3. Venous access was performed through subclavian vein (with 7F sheath) and right femoral vein (two punctures with 8F and 11F sheaths). Single transseptal access was performed under fluoroscopic guidance. Nonfractionated heparin 70-90 ME/kg was administered immediately after transseptal access and then ACT was maintained between 350 and 450 s. Ostial pulmonary veins ablation was carried out in 63 cases. Left atrial ablation including circumferential PV isolation or ganglionated plexuses ablation under electroanatomical guidence was performed in 247 cases. After ablation subclavian and femoral sheaths were withdrawn and pressure bandage was placed over femoral access.
Results: Study population consisted of 58% males and 42% females, mean 53.9±10.5 (19-75) years old. Paroxismal AF was presented in 65%, persistent in 16% and longlasting persistent in 19% of patients. Mean CHADS2 score was 0.87±0.78, majority of patients had score 1 or 0. One patient with anticoagulation protocol violation (INR below 1.5) and CHADS2=2 showed ischemic stroke immediately after procedure. In 2 patients haemopericardium was revealed, but did not require additional invasions. One patient had cardiac tamponade due to right ventricle perforation with diagnostic catheter, control anticoagulation test showed INR over 4.5. Big femoral haematoma was revealed in 15 patients after procedure, all cases were followed-up conservatively. In 2 patients femoral vein thrombosis was diagnosed.
Conclusions: Oral anticoagulation continuing before, during and after AF ablation is relatively safe method for thromboembolic events prevention, but it requires strong control of INR level at the day of AF ablation.

PROGNOSTIC IMPACT OF HS-CRP AND IL-6 IN PATIENTS UNDERGOING RADIOFREQUENCY CATHETER ABLATION FOR ATRIAL FIBRILLATION

K. HENNINGSEN[1], S. Therkelsen[2], K. Krabbe[1], H. Bruunsgaard[1], B.K. Pedersen[1], J.H. Svendsen[1]

[1] Rigshospitalet, Copenhagen, DENMARK, [2]Hvidovre Hospital, Copenhagen, DENMARK

Aim: The aim of this study was to assess the predictive value of inflammatory markers in patients with paroxysmal/ persistent atrial fibrillation (AF) treated with radiofrequency catheter ablation.
Methods: Forty-six consecutive patients, mean age 55 years (range 31-81 yrs), with drug-refractory paroxysmal or persistent AF were treated with either segmental or circumferential pulmonary vene (PV) isolation ablation technique. All patients presented with sinus rhythm on inclusion. At follow-up 1, 3, 6 and 12 months after the ablation procedure serial 12-lead ECG was performed. A Holter monitoring lasting at least 14 days was performed before ablation and at the three months follow-up visit. Patients presenting with recurrent symptomatic AF or atrial tachycardia of more than 10 minutes in this period were offered a second ablation session. Blood samples were analysed for interleukin 6 (IL-6) and high sensitivity C-reactive protein (hs-CRP).
Results: After a maximum of 2 ablations, 19 patients (41%) had SR with no recurrence of AF at 12 months follow-up. Patients in SR had significantly lower left atrium diameter (p=0.007) and lower values of both IL-6 (p=0.007) and hs-CRP (p=0.018) at baseline before ablation. IL-6 and hs-CRP concentrations prior to ablation were found to be the only independent predictors of recurrent AF using the multiple regression analysis (p=0.019 and p=0.037, respectively).
Conclusion: In patients with a history of drug refractory paroxysmal or persistent AF treated with RF catheter ablation, elevated levels of IL-6 and hs-CRP at baseline before RF ablation are independent predictors of recurrence of AF.

EFFICIENCY OF RADIOFREQUENCY ABLATION IN CHRONIC ATRIAL FIBRILLATION PATIENTS

A. ARDASHEV, E. Zhelyakov, A. Shavarov, M. Rybachenko

Burdenko Head clinical hospital, Moscow, RUSSIA

Purpose: To access radiofrequency ablation (RFA) efficiency in chronic atrial fibrillation (AFib) patients.
Material and methods: From 1999 to 2007 were performed 240 RFA of AFib using LASSO-technique and CARTO system. Guided by CARTO system 28 consecutive patients (10 women, 58.2±11.6 years of age) with the chronic AFib underwent circumferential RFA. Chronic AFib anamnesis was 4.3±3.7 years (from 1 year to 11 years). In 16% of cases myocarditis history was noted, 21 pts (76%) had coronary artery disease, idiopathic variant of chronic AFib were observed in 8% of cases. All pts received III class antiarrhythmic drugs before and after RFA.
Results: Follow up was 10.4±4.1 mos. "First month arrhythmias" manifested in 6 (20%) pts (atypical atrial flutter (AAF), focal atrial tachycardia, allorhythmic atrial premature activity) after primary RF-ablation session. Electrical and/or drug cardioversion was effective in 3 pts. Effective re-do RFA was performed in 3 (10%) pts with sustained drug-refractory AAF (2 pts) and atrial premature activity from right superior pulmonary vein (1 pts). There was not observed atrial fibrillation or atrial flutter during follow up period.
Conclusion: RFA using the nonfluoroscopic mapping approach is effective and safe technique for sinus rhythm control in chronic AFib pts.

BASELINE EVALUATION AND ACUTE OUTCOMES FROM THE ITALIAN REGISTRY ON ENSITE NAVX ATRIAL FIBRILLATION ABLATION PROCEDURES (IRON-AF)

G. De Martino[1], M. Mantica[2], E. Menardi[3], C. Tondo[4], N. Trevisi[5], M. Faustino[6], C. Muto[7], C. Pandozi[8], M. Santamaria[9], C. MANCUSI[1], E. Romano[10]

[1]Casa di Cura Santa Maria, Bari, ITALY, [2]Istituto Clinico Sant'Ambrogio, Milan, ITALY, [3]A.O. Santa Croce e Carle, Cuneo, ITALY, [4]Cardiac Arrhythmia and Heart Failure Research Center, St. Camillo-Forlanini Hospital, Catholic University Sacred Heart, Rome, ITALY, [5]Centro Cardiologico Monzino, Milan, ITALY, [6]Casa di Cura Pierangeli, Pescara, ITALY, [7]P.O. Santa Maria di Loreto Nuovo, Naples,

ITALY, [8]A.C.O. San Filippo Neri, Rome, ITALY, [9]Centro di Ricerca ad Alta Tecnologia nelle Scienze Biomediche, Campobasso, ITALY, [10] St. Jude Medical, Milan, ITALY

Atrial fibrillation (AF) field is rapidly evolving and nonfluoroscopic mapping systems are more frequently used in guiding procedures. To date, in Italy no prospective registry on a single system exists.
Aim of the IRON-AF is to provide a general overview of the ablation common practice using the EnSite NavX navigation system.
From Nov 2006 to May 2008, 551 consecutive patients, undergoing AF catheter ablation, were enrolled in 16 centres. Ablations were performed with patient's cardiac anatomy 3D model and catheters' simultaneous visualization. Baseline data, ablation procedural techniques, complications and outcomes at pre-discharge follow-up, were analyzed.
Data from 534 patients (age 60±10, 67% male, NYHA class I: 76%; II: 24%; III: 4%), were analyzed. 240 (45%) had a documented history of paroxysmal AF, 224 (42%) persistent and 69 (13%) showed longstanding persistent AF.
266 patients (49,8%) had no underlying structural cardiomyopathy; 138 (26%) had hypertensive and 33 (6,2%) dilated cardiomyopathy; 33 (6,2%) coronary artery disease; 29 (5,4%) valvulopathy and 35 (6,5%) hypertrophy or other. Most common symptoms were palpitations and dyspnea.
Echocardiographic data were collected (LA diameter 44.4±6.4 mm; LVEF 56.5±9%).
500 (93.6%) patients were under antiarrhythmics and 272 (51%) were in arrhythmia, before the procedure. 192 patients (36%) underwent the ablation under general anaesthesia rather than sedation. After ablation, 24 (4.5%) patients were still in AF despite direct external cardioversion. Procedure duration was 196'±72'; fluoroscopy time 50'±36'. No procedure-related death was observed. Peri-procedural complications occurred in 14 cases (2.6%): with 4 (0.8%) conservatively treated pericardial effusions, 4 (%) minor bleeding events, 2 (0.4%) temporary A-V blocks, 1 (0.2%) cardiac tamponade, 1 pulmonary aedema, 1 symptomatic severe bradycardia.
After a short learning-curve, NavX mapping helps reducing procedural and fluoroscopy times, maintaining or improving safety and acute success rate.

SECRETION OF PROANP AND NT-BNP IN PATIENTS AFTER MAZE PROCEDURE

R. BATALOV, S. Popov, I. Antonchenko, T. Suslova, O. Gruzdeva, S. Kremeno, Y. Egai

Scientific Institute of Cardiology, Tomsk, RUSSIA

Atrial fibrillation (AF) is the most common clinical arrhythmia. Pathophysiologic mechanisms are multifactorial, organic heart disease related to systolic, diastolic, or valvular dysfunction increases the likelihood of both AF and heart failure. Maze procedure for treatment of of AF is associated with significant atrial damage. It is influence on endocrine function of atrium. Natriuretic peptides are hormones which secreted by atrium and changes of them can explain changes in atrial myocardium before and after Maze. In study were included patients with persistent and permanent AF, who underwent Maze procedure. Blood samples collected before, after procedure, 24 h, 3 and 6 month. Value of NT- brain (NT-BNP) and pro-atrial natriuretic peptides (proANP) determined by immunoferment assay. All patient divided in two groups. In first group were included 23 (14 male) patients (64±11 yo) with permanent AF and 27 (18 male) patients (62±9 yo) with persistent AF in second group. All patients in 6 month follow-up period hadn't AF. In patients from 1st group values of NT-BNP and proANP was higher than 2nd group (64.3±2.8 and 6.6±0.9; 43.1±4.5 fmol/ml and 3.6±0.86 pmol/ml respectively ($p<0.01$), before procedure. Immediately after procedure and through 24 h values of peptides were comparable (67.3±5.2 and 7.1±0.7 l; 65.2±3.1 fmol/ml and 6.6±0.6 pmol/ml respectively). After 3 month proANP value in 1st group was more higher (5.6±0.7 pmol/ml) than 2nd group (2.0±0.3 pmol/ml), but NT-BNP was comparable in both group and less than value before procedure (45.2±3.2 and 40.9±2.8 fmol/ml). After 6 month with values of proANP and NT-BNP were less than before procedure and proANP in both group were comparable (21.4±5.8 and 2.8±0.5; 16.3±5.5 fmol/ml and 1.6±0.6 pmol/ml respectively ($p<0.01$). Our study shown that restoration of endocrine function of heart appear after 6 month absence of AF. Secretion of proANP is more sensitve than NT-BNP for assessment endocrine function.

SURGICAL TREATMENT OF ATRIAL FIBRILLATION USING HIGH INTENSITY FOCUSED ULTRASOUND: IS THE THORACOSCOPIC APPROACH A VALID OPTION?

J. ROBIN, J. Ninet, R. Henaine, C. Bauer, F. Wautot, J. Nloga, O. Desebbe

Hopital Cardiologique and Claude Bernard University, Lyon, FRANCE

The feasibility, safety and efficacy of High Intensity Focused Ultrasound (Epicor®) applied off-pump on a beating heart, through a median sternotomy as a surgical treatment of atrial fibrillation (AF) have been recently published and proved. The purpose of this retrospective study was to evaluate the feasibility of HIFU delivery using a minimally invasive approach.

To date, 221 patients underwent an Epicor AF ablation in our Institution. In 9 cases, the heart was approached through a reduced incision: right lateral small thoracotomy in 5 patients, right minithoracotomy using a videoassistance in 4.
The incision was done in the 4th intercostal space without ribs retraction. Under thoracoscopic guidance, the pericardium was opened, the superior and inferior veina cavae isolated..Then a sizer was introduced around the left atrium and a correct sized Ultracinch was positionned in order to create the "epicardial box lesion". The ablation time was 11 minutes at mean.
Concommitant cardiac surgery was performed in 5 patients (Mitral in 4, ASD in 1), while the procedure was offered in 4 patients with stand alone AF. The mean age was 59.5+/-5 years. The duration of AF ranged from 6 to 240 months, with a mean of 50. The mean LA diameter was 52+/-11 mm. The number of cells on the UltraCinch ranged from 8 to12.
There was no mortality or morbidity and no device-related complication. The average length of stay for patient with stand alone was 4 days and 7 days for concomitant surgery. At a minimum of 6 months of follow-up, the freedom of AF was 77% (100% in paroxysmal AF). 5 patients had a cardioversion between 3 and 6 months of follow-up.
A videoscopic appoach for HIFU delivery is a valid option and presents minimal risks to the patient. The procedure is particularly attractive in patients with stand alone AF.

NON INVASIVE EVALUATION OF ATRIAL REMODELING IN PATIENTS WITH PAROXYSMAL AND PERSISTENT ATRIAL FIBRILLATION

M. SPINELLI, L. Fusè, S. De Ceglia, G. Rovaris, A. Vincenti

Unit of Electrophysiology and Cardiac Pacing - St Gerardo Hospital, Monza (MI), ITALY

Backround: Atrial remodelling (AR) is characterised by modifications of electrophysiologic properties, mainly of refractory period, and intra-atrial conduction velocity, and is the main cause of atrial fibrillation becaming persistent. Aim the the study is non invasively evaluate the degree of AR.

Materials and methods: P wave duration (PWD) was evaluated after drug discontinuation, with high frequency signal averaging ECG, and was considered indicative of intra-atrial conduction velocity. Left atrial dimension (LAD) was also evaluated in AF patients (antero-posterior diameter in long axis echo projection). A product of these two parameters was also texted as an index of atrial remodelling (ARI). These parameters were measured in 18 normal people, in 23 patients with paroxysmal AF fibrillation (PAAF), and in 12 patients with persistent atrial fibrillation (PEAF). Patients with PAAF were further divided in 11 "true" paroxysmal (TPAF) when the arrhythmia was self-terminating, and in 12 "false" paroxysmal (FPAF) when AF was terminated by drugs within 48 hrs.

Results:

		PWD (msec)	LAD (cm)	ARI (msec*cm)
Controls	18	124.5+8.4		
AF	35	152.4+13.9*	4.06+0.6	620.5+123.7
TPAF	11	144.3+15.1**	3.73+0.6§	539.3+101.2°
FPAF	12	155.25+13.8	3.98+0.4	621.8+104.9
PEAF	12	155.7+13.4	4.43+0.3	693.6+120.8

*p<0.000 vs controls
**p=0.03 vs FPAF+PEAF §p=0.01 vs FPAF+PEAF, °p=0.006 vs FPAF+PEAF
§p=0.005 vs PEAF °p=0.003 vs PEAF

Conclusion: P wave duration evaluated with high frequency averaging ECG is able to discriminate between normals and patients with AF: a threshold value of 145 msec has a 65% sensibility and 100% specificity. PWD is also longer in patients with persistent AF and "false" paroxysmal AF comparing with patient with "true" paroxysmal AF. The combination of PWD values with LAD is able to better discriminate the degree of atrial remodelling.

IMPEDANCE BASED CATHETER TIP-TO-TISSUE CONTACT ASSESSMENT IN HUMANS DURING ATRIAL FIBRILLATION ABLATION

C. PIORKOWSKI[1], H.J. Sih[2], P. Sommer[1], L. Teplitsky[2], G. Hindricks[1]

[1] University of Leipzig - Heart Center, Department of Electrophysiology, Leipzig, GERMANY, [2] St Jude Medical, Atrial Fibrillation Division, Department of Therapy Development, Minnetonka, USA

Purpose: The quality of catheter tip-to-tissue contact is critical to safe and efficacious ablation. A new method of contact assessment based on the local electrical properties at the catheter tip-to-tissue interface was validated in a blinded fashion in the clinical setting of atrial fibrillation (AF) catheter ablation.

Methods: Using a 3-terminal circuit model, local complex impedance between catheter tip and tissue surface were measured and used to derive an electrical coupling index (ECI). In twelve patients undergoing AF catheter ablation, the catheter was placed in unambiguous contact with the left atrial endocardium and in unambiguous non-contact within the left atrial cavity. Blinded to the physician, electrogram amplitudes, pacing thresholds, local complex impedances and ECI at the catheter tip-to-tissue interface were measured.

Results: Changes in local complex impedance predicted contact and non-contact catheter positions. As the catheter went from non-contact to contact locations, the ECI increased from 118±15 to 145±24 ($p<0.0001$). Similarly, electrogram amplitudes increased from 0.14±0.16 to 2.0±1.9 mV ($p<0.0001$), and pacing thresholds decreased from 13.9±3.1 to 3.1±2.9 mA ($p<0.0001$). N-way ANOVA analysis revealed no significant effect on ECI by operator, body-mass index, or type of AF. On multivariate analysis, ECI improved the clinician's ability to predict "true contact."

Conclusion: Measurement of electrical coupling index between catheter tip and tissue is feasible to reproducibly predict electrical catheter contact in human radiofrequency ablation and can improve the clinician's ability to predict "true contact".

ELECTROGRAM REDUCTION CORRELATION TO LESION VOLUME IN A PORCINE MODEL

H. MCELDERRY[1], R. Robichaux[1], H. Carter[2], P. Beam[2], L. Teplitsky[2], C. Killingsworth[1]

[1] University of Alabama Birmingham, Birmingham, USA, [2] St. Jude Medical, Minnetonka, USA

Background: It is widely speculated that bipolar electrogram reduction (EgrmR) recorded by the distal pair of electrodes correlates to endocardial lesion formation when ablating within atrial tissue. Transmural lesions are important in ensuring conduction block in arrythmogenic substrates. It was hypothesized that reduction in Egrm amplitude would correlate to the lesion depth (and/or transmurality), as well as radiofrequency (RF) energy parameters in a porcine model.

Methods: Twenty-two pigs underwent an ablation procedure utilizing 3 different ablation catheters; two open irrigated (2.5 and 3.5 mm electrode tip) and one 8mm standard RF catheter. Four 30sec focal lesions were placed in each of the LA, posterior RA and along the cavotricuspid isthmus. RF energy was applied in a therapeutic range (2.5mm = 25W, 55°C; 3.5mm = 30W, 40°C, 8mm = 70W, 55°C). The animals were sacrificed immediately following the procedure. Egrm amplitude was recorded at 5sec pre and post-ablation. All hearts were excised, stained with TTC, and then analyzed in gross necropsy. Lesion measurements and transmurality were recorded, and correlation to electrogram data was assessed.

Results: A total of 204 lesions were studied. Lesion EgrmR>77% ensured transmurality (n=19); however, there was not a correlation between amount of EgrmR and lesion depth, lesion volume or transmurality for any of the catheters. Across the catheters, regardless of location, R2 values ranged from 0.007-0.14 for lesion depth, 0.002-0.10 for lesion volume and 0.002-0.05 for acute transmurality. Lesions were found to be transmural with EgrmR as low as 6.2% (range=6.2-93.2%).

Conclusion: Although EgrmR>77% can predict lesion transmurality with RF energy delivery, there was no evidence of correlation between lesion transmurality, volume or depth and EgrmR. Because lesions may be transmural with <10% EgrmR, other tools in conjunction with EgrmR monitoring must be used to assure safe RF energy delivery.

THE INFLUENCE OF AGE IN TILT TESTING IN PATIENTS WITH SYNCOPE OF UNKNOWN AETIOLOGY

S. GIL, D. Cavaco, R. Gomes, M.J. Grilo, F. Mendes, F. Mesquita, K. Reis-Santos, F. Morgado, D. Bonhorst, P. Adragao, J. Aniceto Silva

Hospital de Santa Cruz, Lisboa, PORTUGAL

Purpose: Evaluate if Tilt table test results (TT) are influenced by age and if the coexistence of heart disease would also interfere with TT results.
Methods: We included 764 consecutive patients (pts) with syncope of unknown aetiology, that performed TT, between January 1994 and December 2006, in a single centre. Patients were divided in two Groups: Group 1 (<40 years old) - 302 pts (39.5%) and Group 2 (≥40 years old) - 462 pts (60.5%). The prevalence of positive TT in the two groups was compared and, in each group, according to the existence or not of underlying cardiovascular disease: Group 1 - 281 pts (93%) without CV disease and 21 pts (7%) with CV disease; Group 2 - 338 pts (73%) without CV disease and 124 pts (27%) with CV disease. A subgroup including the older pts (≥70 years old), 152 pts, was analysed concerning cardiovascular pathology co-existence: 97 pts (64%) with CV disease known and 55 pts (36%) without CV disease.
Results: Group 1 had higher prevalence of positive TT (53% vs 40%) (p=0.0006). Analysing the subgroups divided according to the existence of CV disease (53% without disease in Group 1 vs 42% without disease in Group 2), there was no significant difference. The presence of CV pathology only influenced the results of TT in the older sub-group (≥ 70 years) being positive in 49% of the pts without CV disease vs. 31% in pts with CV disease (p=0.02).
Conclusion: Although demonstrating that in younger pts with syncope (age<40 years old) the percentage of positive TT is higher, this study demonstrates that this results doesnt depend on the existence of underlying CV disease. Only in older patients the existence of CV disease had conditioned the results of the test.

64-MULTISLICE CT EVALUATION OF CARDIAC VENOUS ANATOMY IN PATIENTS WITH CORONARY ARTERY DISEASE

I. BERTOLOZZI[1], G. Tognini[2], T. Torri[2], A. Pucci[1]

[1] *Cardiologia e Cardiostimolazione, Ospedale di Carrara, Carrara, ITALY,*
[2] *UO Radiologia, ospedale di Carrara, Carrara, ITALY*

Purpose: The detailed knowledge of coronary venous system (CVS) anatomy could play a key role for preoperative planning of cardiac resynchronization therapy (CRT) implantation. Recently has been demonstrated that non-invasive evaluation of CVS with MSCT is feasible.
Methods: The 64-multislice CT performed to visualize coronary arteries of 156 patients (66±9 y) with known and suspected CAD were studied. Imaging study was performed with 64-detector raw Light Speed VCT scanner (GE Medical Systems, Milwakee, US); 120 ml of contrast material (Iomeron 400, Bracco) were injected (rate: 5 ml/s).
Results: The patients had previous CABG in 42%, previous MI in 22% (Q 44%; inferior 48%). in the large majority of cases the left ventricular function was preserved (EF 52±9%), all patients were in sinus rhythm. No MSCT had to be excluded because of suboptimal study quality. The coronary sinus (CS) anterior and posterior interventricular vein were observed in all pts. The lateral marginal vein (LMV) was identified in 65%; the posterior vein (PV) in 72%, both PV and LMV were observed in 41%, while in 5 pts with history of previous CABG and MI both PV and LMV were absent (3.2%). The prevalence of LMV with angle of detachment <90°, thus difficult for cannulation, was 13%. A significant CS stenosis was identified in 10 cases with previous CABG. A prominent Thebesian valve was detectable in 30% of cases. The left phrenic nerve and its relation to CVS was identified in 35% of cases.
Conclusion: MSCT was able to visualize the cardiac venous system and to identify potential obstacles for optimal left ventricular lead positioning in CRT.

ASSOCIATIONS BETWEEN ELECTROCARDIOGRAPHIC INTERVAL DURATIONS AND BRUGADA SYNDROME

L.P. PAPAVASILEIOU, L. Santini, V. Romano, A. Politano, L. Duro, A. Panella, L. Santucci, G. Magliano, M. Sgueglia, V. Brusca, A. Giomi, I. Stella, G.B. Forleo, F. Romeo

Cardiology Department, Policlinico di Tor Vergata, Rome, ITALY

Introduction: Mutations in the cardiac sodium channel gene SCN5A, is know to be related with the Brugada Syndrome (BrS). However the BrS is not the only phenotype linked mutation in this gene. Others recognized allelic disorders are: LQT3 variant of long QT Syndrome, the progressive cardiac conduction defect (PFHB) and Sick Sinus Syndrome (SSS1). Aim of the study was to evaluate the correlation between conduction delays and Brugada pattern at basal ECG of patients (pts) with Brugada pattern ECG.
Methods and Results: Forty-six patients (44 men) with Brugada pattern ECG (8/46 Type I, 31/46 Type II, 7/46 Type III) were evaluated. The PR, QRS and QT intervals were analyzed. Intraventricular conduction delay was considered in presence of a QRS duration >100 ms and a QTc >440 ms was considered as a long QT interval.
Twenty-five pts (55%) presented one or more conduction delays at basal ECG. One patient (Type I) presented a short PR interval, 6/46 (13%) presented a long PR interval (1 Type I, 4 Type II, 1 Type III). Twenty pts (43.5%) presented an interventricular conduction delay (5 Type I, 16 Type II, 4 Type III) and 4 pts (8.7%) had a QRS >120 ms (2 Type I, 2 Type III). Five pts (10.9%) presented a long QT interval (4 Type I, 1 Type III). Only the long QT interval and the duration of QRS >120 ms resulted statistically significant.
Conclusions: The ECG Brugada pattern is often correlated with conduction delays. Conduction delay abnormalities were common in our study subjects, in addition a relative high number of patients presented a long QT interval. Indentificating carriers of a SCN5A mutation and clinical follow-up of patients and family members over time might be useful because of the risk associated with conduction abnormalities.

TRANSSEPTAL PUNCTURE USING A RADIOFREQUENCY SYSTEM FOR LEFT-SIDE CATHETER ABLATION PROCEDURES: A NOVEL APPROACH AS AN ALTERNATIVE TO CONVENTIONAL NEEDLE PUNCTURE

F. PENTIMALLI[1], A. SAGONE[1], D. SALA[1], A. MAITILASSO[2]

[1]Ospedale Luigi Sacco, A.O., Polo Universitario, Milano, ITALY, [2]AB Medica SPA, Lainate, ITALY

Introduction: In the past few years there was an exponential rise into the number of left side catheter ablation procedures. The traditional transseptal puncture is a hazardous challenge even for skilled operators, with an incidence of 1.2% of complications. Difficulty increases in the presence of thickened, elastic or displaced septa. Several imaging techniques have been developed to increase safety. On the whole, technique and devices have remained largely unchanged in the last forty years. The purpose of this study was to demonstrate safety and efficacy of a novel radiofrequency (RF) system to perform transseptal puncture.
Materials/Methods: 10 patients (6 males, 4 females, aged 23-72 years; 2 patients with a left sided accessory pathway, 8 patients with paroxysmal/persistent atrial fibrillation) underwent an intraoperative transseptal puncture, performed using a new RF system (Baylis MC). Unlike the traditional system, where the operator uses mechanical force over the needle, with the risk of potential damage to the adjacent area (overshoot phenomenon), the transseptal catheter creates a controlled puncture delivering RF energy (2 seconds, 10 W power). The RF application time is sufficient to advance the catheter for approximately 1 cm. An accidental contact to adjacent areas beyond the transseptal puncture would have the same effect as obtained by an accidental contact of a guide-wire. The distal segment, has four side-holes, facilitating diagnostic pressure monitoring and delivery of contrast agent. In the RF system the needle-like curve is provided by the specially designed dilator-sheath set.
Results: Transseptal puncture using RF was performed with success in all patients (100%), for a total number of 18 punctures. No complications were experienced in our series.
Conclusions: In patients who are candidates for transseptal puncture, the use of this RF system is a feasible option. It appears to be a safe and effective alternative, with potential advantages over the conventional transseptal puncture.

ANATOMICAL CORRELATION OF ESOPHAGEAL TEMPERATURE MONITORING DURING RADIOFREQUENCY ABLATION IN LEFT ATRIUM

M. GALEAZZI[1], S. Ficili[1], M.A. Elian[2], V. Pasceri[1], M. Russo[1], C. Lavalle[1], F. Venditti[1], A. Pandozi[1], C. Pandozi[1], M. Santini[1]

[1]Dipartimento Cardiovascolare, Ospedale San Filippo Neri, Rome, ITALY, [2]Department of cardiology-Benha university hospital, Benha, EGYPT

Purpose: Because radiofrequency (RF) ablation in left atrium (LA) in awake patients is often linked to the development of visceral pain, we have investigated the role of esophageal warming in the developement of RF-related pain.
Methods: An esophageal probe (EP) capable to measure endo-oesophageal temperature (Esotherm 4, FIAB) was positioned before starting the procedure. LA electroanatomical reconstruction was then obtained by using current specific tools. EP position (lateral, central or medial) as compared to LA posterior wall was evaluated through fluoroscopy imaging. LA surface was then divided into 12 zones (6 anterior and 6 posterior) and maximal esophageal temperature (ET) was measured at the end of each RF delivery, considering the relative position of the ablator catheter. The patient was asked to define the intensity of the pain experienced during each RF delivery by using an intensity score index ranging from 0 (no pain) to 4 (intensive pain requiring immediate interruption of RF).
Results: 20 patients were studied (16 males). EP insertion was generally well tolerated and no patient asked for its removal during the procedure. Mean ET during RF delivery was 39.59±4.71°C. The location of the EP showed a high correlation to the development of the maximal ET raise (Spearman's rank correlation coefficient r=0.49, CI 0.55-0.41). Moreover, the highest values of pain intensity were always reported when RF was delivered at the level of LA zones nearby the EP projection (r=0.50, CI 0.55-0.42) and when the highest levels of ET were reached (r=0.38, CI 0.30-0.45).
Conclusion: LA RF ablation related pain is due (at least partially) to esophageal warming. This represents an important issue as regard the possible developing of esophageal damage.

RADIOFREQUENCY TRANSSEPTAL CATHETERIZATION AS AN ALTERNATIVE METHOD TO CONVENTIONAL NEEDLE PUNCTURE

C. STORTI[1], M. Longobardi[1], M.P. Buzzi[1,2], M.C. Negro[1], E. Broglia[1], A. Baldi[1], C. Falcone[1,2]

[1]Department of Cardiology, Istituto di Cura Città di Pavia, Pavia, ITALY, [2]Interdipartmental Center for Research, CIRMC, University of Pavia, Pavia, ITALY

The expansion in catheter ablations for cardiac arrhythmias has highly increased the number of transseptal punctures that are performed. The standard approach entails the puncture of the interatrial septum with a transseptal needle. This technique is reported to have more than 1% incidence of life-threatening complications due to inappropriate puctures. In the radiofrequency (RF) transseptal approach a specifically designed thin and smooth catheter (distal diameter 1.3mm) takes the place of the metallic needle. The RF transseptal catheter, along with an 8 Fr braided sheath with a fixed shape dilator are positioned against the fossa ovalis.Then, through a single RF application of 2-4'' at 4-8 W the interatrial septum is crossed.
In our Laboratory this new approach has been used in case of unsuccessful conventional puncture due to difficulties to cross the interatrial septum. Our experience with RF transseptal puncture involves 9 cases among 163 consecutive transseptal procedures (5.5%); 3 left accessory pathways and 6 atrial fibrillation ablations. The unsuccessful attempt using the conventional approach was due to resistant and thickened atrial septum in 4 cases; in the remaining 5 patients it was caused by the presence of a mobile or aneurysmal fossa ovalis that tented far into the left atrial cavity, as documented by transesofageal echocardiography or contrast injection. All the 9 RF transseptal procedures were successful at the first attempt, with no complications.
In conclusion, our experience suggests that RF transseptal puncture may be a safe and effective alternative to conventional needle approach. This technique may be particularly useful in presence of very resistant or very elastic fossa ovalis. Its safety mainly derives from the floppy and atraumatic catheter that is incapable of mechanically forcing the septum, and from the energy and timing levels used during RF applications that give little or no chance of left atrial free wall puncture.

EFFECT OF PROXIMAL CORONARY SINUS ISOLATION DURING RE-DO ABLATION IN PATIENTS WITH ATYPICAL ATRIAL FLUTTER

A. ARDASHEV, E. Zhelyakov, A. Shavarov

Burdenko Head clinical hospital, Moscow, RUSSIA

Purpose: To assess the role of coronary sinus (CS) as component of atypical atrial flutter (AAF) reentry circuit after RFA of atrial fibrillation (AFib) pts.
Methods: Study consisted of 102 consecutive patients (44 women, 54.3±13.6 years of age) with the paroxysmal (51%), persistent (22%) and chronic (27%) AFib underwent circumferential RFA guided by CARTO system. AAF manifested in 22 (22%) pts after primary RF-ablation session in the period of 23±15 days. Electrical and/or drug cardioversion was effective in 13 pts. Repeated RFA was performed in 9 (9%) pts with sustained drug-refractory AAF.
Results: Activation mapping guided by CARTO system revealed reentry circuits (cycle length 220 and 230 ms) at the vicinity of right pulmonary veins in 2 pts and atrial perimitral reentry with mean cycle length of 240±15 ms in 7 pts. Left mitral isthmus-dependent AAF was verified by entrainment technique and successfully ablated in all 7 cases. RF-isolation of distal CS (12-1 to 3 clock on LAO view) was performed in all cases as first step without any corresponding cycle length changes of AAF. As a second step AAF was terminated during left mitral ablation only in 2 pts. As a third step linear RF-lesions from right pulmonary vein ostium to mitral annulus were performed and turned out to be associated with increasing of AAF cycle length (from 240±10 ms to 340±20 ms, p<0.001) in 5 cases. Additional RF-application applied inside the proximal CS roof (fourth-step) terminated AAF in 5 pts. There was no arrhythmias induction while of control left auricular burst and programmed stimulation. Follow-up was 6.7±2.4 mos. There were neither AFib nor AAF during follow up period observed.
Conclusion: Structures of proximal CS corresponding to low common pathway insertion could be critical component of reentry circuit in some cases of AAF after RFA of AFib pts.

EFFECTS OF INADVERTENT AV-BLOCK DURING SLOW PATHWAY CRYOABLATION FOR AVNRT ON CLINICAL OUTCOME.

F. GUEFFAF, A. De Sisti, J. Tonet, J.-F. Leclercq, F. Touil, J. Lacotte, PH. Aouate, F. Hidden-Lucet, R. Frank

Rhythmology Department, Cardiology Institut, Pitié-Salpetriere Hospital, Paris, FRANCE

Aim: Transient AV-block during AVNRT cryoablation was correlated to recurrence.
Methods: In 150 consecutive pts with AVNRT (39±14 years, ineffective AA drugs 1.9±1.3), slow pathway cryoablation was performed. A 7 Fr 6-mm-tip cryocatheter was used. After successful cryomapping (-30°C), defined as jump abolition or AV nodal refractoriness prolongation, cryoablation (-80°C for 4 min) was applied if no AV-block occurred. AVNRT inducibility was checked 30 min later.
Results: Acute success was achieved in 142 patients (95%). During a follow-up of 18±10 months, 116 patients (79%) were recurrence-free (including also 2 patients with unsuccessful procedure). During cryoablation inadvertent different degrees of AV-block were encountered in 34 patients (22.7%). In 24 of them AV-block occurred at the last site (13 with increased PR, 11 with 2nd-3rd AV-block). Unsuccessful acute procedure (p<0.001), increased PR duration at last site (p<0.001), and residual jump (p<0.02), were correlated with recurrence. Unsuccessful acute procedure (p<0.03), increased PR duration at last site (p<0.01), were independently significant. When considering only the last site attempt, we compared 3 groups of patients: 13 with increased PR duration (A), 11 with 2nd-3rd degree AV-block (B), and 126 without AV-block (C). Cryo-application time at last effective site was 277±203 sec in A, 75±87 sec in B, and 253±135 sec in C (A vs B, p<0.01; B vs C, p<0.001). There was no statistical difference among groups in A/V ratio, unsuccessful acute procedure, residual jump, and cryoablation re-intervention. Actuarial incidence of recurrence-free status at 12 months was 38% in A, 82% in B, and 82% in C (A vs B, p<0.05; C vs A, p<0.001).
Conclusions: All AV-blocks during cryoablation were transient stressing on safety of this method. An increased PR duration at last site is associated with a higher recurrence rate, while 2nd-3rd degree AV-block has a recurrence rate similar to patients without AV-block.

IMPULSE PROPAGATION INTO THE KOCH TRIANGLE IN PATIENTS WITH AND WITHOUT AV NODAL TACHYCARDIA

C. PANDOZI[1], S. Dottori[2], S. Ficili[1], M. Galeazzi[1], C. Lavalle[1], M. Russo[1], F. Venditti[1], A. Pandozi[1], M. Santini[1]

[1]Department of Cardiology, San Filippo Neri Hospital, Rome, ITALY, [2]Biosense Webster Italy, Johnson & Johnson Medical, Milan, ITALY

Purpose: We investigated the propagation of sinus impulse into the Koch triangle (KT) in patients with or without AV nodal reentrant tachycardia (AVNRT). Particularly, it was evaluated the presence of conduction block (CB) at the level of the tendon of Todaro (TT), as suggested by previous papers.
Methods: 27 patients underwent a sinus-rhythm 3-dimensional (3D) electroanatomic mapping (EAM) procedure (CartoTM system, Biosense Webster, Inc., Diamond Bar, CA, USA) of the right atrium (RA). 6 patients with AVNRT were studied before slow pathway ablation, while 21 patients were studied during electrophysiological study performed for right-sided ablation.or ventricular vulnerability evaluation.
The KT was identified by localizing and tagging the ostium of coronary sinus (CS os), the His bundle recording site and the septal leaflet of the tricuspid valve. The TT was supposed to lay along the line connecting the CS os with the His bundle recording site.
Conduction velocity along was evaluated quantitatively on the activation map and qualitatively on the isochronal/propagation maps.
Results: A mean of 140+21 points were sampled all over the RA mapping while a mean of 70+16 points (XX%) were collected inside the KT. Propagation block at the level of CT was not found in any patient.
Slow conduction inside the KT was found in all the patients in both those with AVNRT and in those without AVNRT. The mean conduction velocity in the right atrium was 0.9+0.2 msec while conduction velocity inside the KT was 0.5+.0.2.mm/msec (p<0.05).
Slow pathway rapid potentials were identified inside the KT in all patients. The rapid component of the rapid potential, not the far field atrial potential, was selected to define the local activation time.
Conclusions:
1) Activation maps show that no CB is present at the level of TT in pts with and without AVNRT.
2) Marked slowing of conduction is present during propagation of sinus impulse inside the KT.
3) This conduction slowing, not the presence of CB at the level of TT, is responsible of the later activation of slow pathway compared to that of CS os.

PROGNOSIS OF PATIENTS WITH UNEXPLAINED SYNCOPE OR SUSPECTED NEURALLY-MEDIATED SYNCOPE: POOLED DATA FROM ISSUE AND ISSUE 2 STUDIES

F. GIADA[1], A. Raviele[1], C. Menozzi[2], A. Moya[3], R. Garcia-Civera[4], R. Sutton[5], N. Grovale[6], T. De Santo[6], M. Brignole[7]

[1]Ospedale dell'Angelo, Mestre, ITALY, [2]Arcispedale S. Maria Nuova, Reggio Emilia, ITALY, [3]Hospital General Vall Hebron, Barcelona, SPAIN, [4]Hospital Clinico, Valencia, SPAIN, [5]Royal Brompton and Harefields Hospitals, London, UK, [6]Medtronic Italy, Rome, ITALY, [7]Ospedali del Tigullio, Lavagna, ITALY

Aim: To evaluate the long-term prognosis of patients (pts) with recurrent syncope of uncertain origin or suspected neurally-mediated implanted with loop recorder (ILR), coming from ISSUE and ISSUE2 studies.
Methods: 590 pts (52% males, mean age 66±14 years, 75% with normal ECG, 75% without structural heart disease and 34% with positive Tilt Table Testing) were followed-up for a minimum period of 2 years after ILR implantation. Actuarial risk estimation (AR) was performed to evaluate the risk of syncope recurrence during follow-up.
Results: Among 590 pts, 211 (36%) had at least one syncopal episode during follow-up. In the following the risk of syncope recurrence after ILR implant is reported considering the number of syncope during lifetime (NSDL) and the number of syncope in the last 2 years (NSL2Y).

NSDL=1-2; AR 1 year=15.4%; AR 2 years=19.7%; Estimated Risk (ER) 4 years*=28.2%
NSDL=3; AR 1 year=36.5%; AR 2 years=41.7%; ER 4 years*=52.2%
NSDL=4-6; AR 1 year=37.0%; AR 2 years=43.8%; ER 4 years*=57.4%
NSDL =7-10; AR 1 year=37.5%; AR 2 years=43.7%; ER 4 years*=56.2%
NSDL= >10; AR 1 year=44.3%; AR 2 years=56.4%; ER 4 years*=80.7%
NSL2Y=1-2; AR 1 year=22.8%; AR 2 years=27.5%; ER 4 years*=37.1%
NSL2Y=3; AR 1 year=29.1%; AR 2 years=35.7%; ER 4 years*=48.9%
NSL2Y=4-6; AR 1 year=43.0%; AR 2 years=50.8%; ER 4 years*=66.3%
NSL2Y=7-10; AR 1 year=43.2%; AR 2 years=48.8%; ER 4 years*=59.9%
NSL2Y= >10; AR 1 year=85.6%; AR 2 years=98.1%; ER 4 years*=100%

Conclusions: A total number >=3 of syncopal episodes during lifetime seems to almost double the risk of syncope recurrence. If we consider only the number of syncope in the last 2 years before enrolment, the risk of syncope recurrence follows a more linear trend increasing the syncopal burden.
* assuming a linear increase

RELATIONS BETWEEN SINUS NODE AUTOMATISM, EXERCISE INDUCED CHRONOTROPIC INCOMPETENCE AND CARDIOINHIBITORY RESPONSE TO ORTHOSTATIC STRESS IN PTS WITH VASOVAGAL SYNCOPE

M. WNUK, A. Pietrucha, E. Wojewodka-Zak, M. Wegrzynowska, D. Mroczek-Czernecka, I. Bzukala, E. Konduracka, W. Piwowarska

Coronary Disease Department, Institute of Cardiology, CMUJ, Krakow, POLAND

Aim: Evaluation of SN function assessed by SN automatism, chronotropy and cardioinhibitory response to orthostatic stress in pts with VVS.
Study population: 258pts with VVS 147women, aged 18-62yrs.:
Gr.I 97pts with mixed VVS (MI VVS);
Gr.II 42pts with cardioinhibitory VVS (CI VVS);
Gr.III 74pts with vasodepressive VVS (VD VVS);
Gr.IV 45pts with negative HUTT.
Methods: All pts underwent RAS for evaluation of IHR, extrinsic and intrinsic SNRT, CNRT and SACT. Each gr. consisted of subgr. with or without cardioinhibitory incompetence (Ch-Inc). All pts underwent ETT. We considered: duration of exercise(ETT-T), achieved peak HR(%HRmax), maximal metabolic workload(METS) and presence of Ch-Inc(failure to reach 85% of %HRmax).
Results: Reduced IHR occurred in all gr.(gr.I 19.6%,gr.II 16.7%,gr. III 16.2%,gr.IV 17.7%). Mean values of SNRT, CNRT and SACT did not differ significantly between all pts. Mild SND occurred with comparable frequency in pts, both extrinsic (gr.I 28.9%; gr.II 31.0 %; gr.III 24.6 %; gr. IV 26.5%), and intrinsic (gr.I 6.2%; gr.II 4.80 %; gr.III 4,1%; gr.IV 4.4%).
Ch-Inc was present in 31.5% of pts, with no significant difference between the gr.(29.8% gr.I, 35.3% gr.II, 28.6% gr.III, 23.2% gr.IV). Mean ETT-T did not differ between studied gr. (gr.I 10.0 min, gr.II 11.3, gr.III 9.9, gr.IV 12.7 min) as well as %HRmax (respectively: 84.7%; 84.6%; 82.1%; and 88.8%) and mean METS (respectively: 9.5, 10.3; 8,5 and 12.6 METS). There were no significant differences in ETT-T and METS between gr. and subgr. %HRmax did not differ between gr., but it was essentially lower in pts with Ch-Inc (mean 69.4% vs 90.6%).
Conclusions: Mild SND was observed with comparable frequency (20-30%) in pts with all types of VVS. Ch-Inc was present in about 30% of pts with VVS, with comparable frequency of occurrence in all types of VVS and pts with negative HUTT.
SND and Ch-Inc seem not to play a pivotal role in pathogenesis of CI VVS.

ANALYSIS OF REGIONAL CEREBRAL OXYGEN SATURATION DURING HEAD-UP TILT TEST IN PATIENT WITH VASO-VAGAL SYNCOPE

A. PIETRUCHA, M. Wnuk, E. Wojewodka-Zak, I. Bzukala, W. Piwowarska

Coronary Disease Department, Institute of Cardiology, Medical School of Jagiellonian University, John Paul II Hospital, Krakow, POLAND

Aim: Evaluation of cerebral regional oxygen saturation during head-up tilt test (HUTT) in patients with vaso-vagal syncope. Regional oxygen saturation could reflex the balance between regional oxygen delivery and oxygen consumption in the cerebral tissue. Study population: we observed 87 pts (55 women, 32 men) aged 18-52 yrs, with vaso-vagal syncope (VVS) referred to HUTT.
Methods: All pts underwent HUTT performed according standard Westminster or Italian protocols. During HUTT the regional oxygen saturation (rSO2) of frontal lobes of brain was measured using INVOS cerebral oximeter system in all pts. The near-infrared sensors were placed on the forehead, above eyebrows. Baseline value of rSO2 was evaluated during 15 minutes supine phase before HUTT. Results of rSO2 evaluation were analysed according to type of vaso-vagal response during HUTT.
Changes of cerebral tissue saturation during HUTT was expressed as a degree of relative decrease (in%) of rSO2. The critical desaturation was assumed as 25% decrease of baseline level of rSO2. Area limited by curve of cerebral oxygenation and baseline level of rSO2 during last 3 minutes of HUTT (ACCO) was also analysed in all patients.
Results: During upright position a down-step decrease of regional oxygen saturation was observed (7-15%). An exaggeration of desaturation, usually with concomitant hyperventilation, followed by short-time (20-180 s) critical desaturation preceded syncope in patients with positive HUTT. Mean value of cerebral desaturation (-31.8 vs -9.0%) and ACCO (-42.0 vs –11.1 %*min) were significantly higher in patients with positive HUTT in comparison to non-fainters. There

were no significant differences of measured parameters between all types of vaso-vagal response.
Conclusions:
1. Mild cerebral desaturation took place during passive tilting both in patients with positive and negative results of head-up tilt test.
2. Significant desaturation with hyperventilation preceded the occurrence of syncope in patients with positive head-up tilt test.

NEURALLY MEDIATED SYNCOPE: CAN AN EARLY DIAGNOSIS REDUCE INSTRUMENTAL TEST?

M. JORFIDA, C. Amellone, M. Antolini, M.C. Marocco, M. Reviglione, M. Bollati, G. Ferraro, M. Anselmino, R. Massa, P.G. Golzio, G.P. Trevi

University Department of Cardiology, S. Giovanni Battista Hospital, Torino, ITALY

Background: Current strategies of syncope diagnosis widely vary among physicians and hospitals, often exposing pts to long and expensive diagnostic management.
Aim of the study: To evaluate the impact of neurally mediated syncope's (NMS) early diagnosis and therapy on diagnostic management and number of tests required.
Methods: 75 consecutive patients discharged from ER during 2007 were referred to our Syncope Lab and divided in two matchable groups; group A: 45 pts with diagnosis of NMS at first evaluation (vasovagal, situational, orthostatic syncope); group B: 30 pts with other causes of transient loss of conscience (TLOC; cardiac, neurologycal, psychogenic, iatrogenic, undefined). A 8,2 (SD 2.6) months follow up was performed in 61 patients.
Results: Before referral to our Lab patients underwent 153 instrumental tests: 46% were applied not according to current ESC guidelines. None of performed tests resulted useful to determinate TLOC cause. In particular, comparing group A with group B, neurological instrumental exams (TC/RMN $p<0.01$, carotid US $p=0.01$, EEG $p<0.01$) and Holter ECG ($p=0.05$) were more frequently inappropriate in group A. All other exams performed never resulted reliable for definitive diagnosis. The only tool significantly correlated with ethiology, especially in group A pts, was careful clinical history recording. At follow-up, early (taken at first visit) diagnosis was confirmed in all group A pts, while only in 61% of group B pts ($p<0.01$). In follow up visits only 11% of group B pts maintained an undefined ethiology. No differences emerged concerning new syncope episodes (21%, $p=0.63$) and hospitalizations (3%, $p=0.13$) in the two groups. Furthermore, no significant life style modifications were reported, except for the preventive measures recommended.
Conclusion: An early diagnosis based on a correct and careful history recording emerged as the best tool, especially in NMS pts, to investigate TLOC and reduce number of instrumental tests normally prescribed to these pts.

USEFULNESS OF EVENT RECORDER "SPIDER FLASH" IN PATIENTS WITH SPORADIC PALPITATIONS, SYNCOPE OR DIZZINESS

G. NERI, D. Vaccari

CARDIOL. DEPT., Montebelluna, ITALY

Background: Event recorder "Spider Flash" (ELA Medical/Sorin Group/France) is an external ECG digital recorder based on an extended loop memory and capable of a memory up to 30 days. The device can be activated by the patients (pts) and records the ECG up to 15 minutes of pre-activation time plus up to 15 min of post-activation as many times as the pts needs. Therefore an event can be caught even if the activation is done after the symptom (for instance, activation after fainting when the pt comes to).
Aim: Evaluate the usefulness of Spider Flash in the diagnosis of pts with sporadic palpitations, syncope or dizziness.
Methods. We have studied 65 pts (mean age 48±9) complaining sporadic palpitations (group 1;n.57) or syncopal spellings or dizziness (group 2; n.8) with standard ECG, Holter ECG and clinical examination not diagnostic.
Results: The mean duration of the recordings was 14±9 days. The recordings have been manually analyzed with appropriate software Event Scope. In group 1 we have found: 5 episodes of supraventricular tachicardia, 8 episodes of atrial flutter or fibrillation, 12 episodes of atrial or ventricular premature beats and 27 of sinus tachicardia. In group 2 we have found: 2 cases of sinus bradicardia at a rate of 30/40 beats per minute, 2 of 2nd degree atrioventricular block (2:1) and 1 of atrial fibrillation with high ventricular rate; in 3 pts complaining dizziness we did not found any arrhythmias at the time of the symptoms reported. All the recordings were of good quality and significant diagnostic informations have been obtained in 46% of the pts.
Conclusions. Spider Flash is a useful diagnostic tool in pts with sporadic palpitations or syncope or dizziness revealing the origin in a large amount of cases and then permitting appropriate therapeutic interventions. It represents a non invasive and cheap alternative to implantable loop recorder.

DIAGNOSIS OF CARDIOGENIC SYNCOPE IN PACEMAKER PATIENT: USEFULNESS OF IMMEDIATE TELEMETRIC INTERROGATION IN THE EMERGENCY DEPARTMENT, CASE REPORT

I. BERTOLOZZI[1], G. Polidori[3], W. Corsini[2], A. Pucci[1]

[1] Cardiologia Cardiostimolazione, Carrara, ITALY, [2] UO Rianimazione, Carrara, ITALY, [3] DEA Careggi, Florence, ITALY

The current guidelines provide for an initial evaluation of the patient with syncope in the Emergency Department (ED) consisting in anamnesis, blood pressure measurement and ECG. If a particular cause of syncope is suspected targeted examinations are indicated. Pacemaker patient may experience syncope on the basis of PM syndrome, device malfunction and ventricular arrhythmias; in many cases the ECG at the admittance is not diagnostic. Telemetric interrogation can help in identifying the underling cause of syncope but this is usually delayed because personnel directly involved in PM follow up is not available in ED.
We report the case of a 67-year old male patient that was admitted in the ED of our Hospital because of syncope and head injury. The patient was diabetic and had history of previous coronary artery bypass graft operation 7 years earlier and had a dual chamber PM implanted (Medtronic ADAPTA ADDR01) for symptomatic sick sinus syndrome one year before. At the admittance the patient was conscious and asymptomatic, he referred unexpected loss of consciousness during intensive hand working in hot environment. Blood pressure was 110/80mmHg, the physical examination was normal and ECG showed spontaneous sinus rhythm 87 bpm without signs of acute myocardial ischemia. Because of these data both an arrhythmic based or neuromediated ipotensive cause of syncope could have been suspected. Telemetric interrogation of the EGM recordings was performed in the ED showing an episode of self terminating ventricular fibrillation (heart rate 350 bpm, duration 29 seconds) as the cause of syncope. The patient was so immediately transferred to the Cardiac Care Unit.
Conclusions: The early PM interrogation in this patients with syncope and structural heart disease allowed the detection of life threatening ventricular arrhythmia. In these high risk cases a telemetric evaluation of the PM should be always performed before discharge from ED.

ATRIAL REFRACTORINESS CHANGES EVOKED BY STIMULATION AND BLOCKADE OF THE AUTONOMIC ACTIVITY IN LONE PAROXYSMAL ATRIAL FIBRILLATION

M. OLIVEIRA[1], M.N. da Silva[1], A. Timoteo[1], J. Feliciano[1], P.S. Cunha[1], S. Santos[1], I. Rocha[2], L. Silva-Carvalho[2], R. Ferreira[1]

[1]Cardiolgy Department, Santa Marta Hospital, Lisbon, PORTUGAL, [2]Unit of Autonomic Nervous System, Institute of Physiology, Faculty of Medicine, Lisbon, PORTUGAL

Heterogeneous shortening of the atrial effective refractory periods (AERP) and increased dispersion of refractoriness (disp_A) predispose to atrial fibrillation (AF).
Aim: To evaluate the effects of stimulation and blockade of the ANS on atrial refractoriness in paroxysmal AF (PAF).
Methods and results: 10 patients (P) (6 men, 55±14 years, >1 year PAF) underwent electrophysiological study while off medication. AERP were assessed at 5 sites - right atrial appendage (RAA), low lateral right atrium (LRA), high interatrial septum (IAS), proximal (pCS) and distal coronary sinus (dCS) in basal, during handgrip (HG), carotid sinus massage (CSM), and after ANS blockade (ANSB) (atropine 0.04 mg/kg+propranolol 0.15 mg/kg). Disp_A was calculated as the difference between the longest and shortest AERP. RR intervals were 853±68 ms, 724±73 ms, 928±131 ms, and 856±81 ms, in basal, HG, MSC and ANSB, respectively ($p<0.05$ for basal vs HG). Systolic blood pressure increased during HG (126±8 mmHg to 135±10 mmHg, $p<0.05$). The AERP were 208±15 ms, 212±22 ms, 252±43 ms, 256±37 ms and 246±31 ms, in RAA, LRA, IAS, pCS and dCS, respectively (RAA vs IAS and pCS, $p<0.05$). During CSM, AERP decreased in LRA, and, after ANSB, increased in dCS. Disp_A was 70±39 ms in basal, 71±34 ms during HG, 75±46 ms with CSM, and 54±37 ms after ANSB ($p<0.05$ for ANSB vs all others). P with inducible AF had higher Disp_A (70±15 ms vs 44±20 ms, $p<0.05$) and a greater reduction of AERP in RAA during HG (11±9% vs 2±4%, $p=0.02$).
Conclusions: In P with PAF, ANS stimulation modify AERP, without a significant impact in disp_A, whereas ANSB increases AERP in dCS and decreases disp_A. Those P with inducible AF show higher disp_A and lower AERP in RAA during sympathetic stimulation. These findings underscore the ANS influence on refractoriness properties related to vulnerability for AF.

TEMPORAL DISTRIBUTION OF ATRIAL FIBRILLATION ONSET: OUTCOME FROM THE BURDEN II STUDY

A. SAGONE[1], R. Quaglione[2], A. Castro[3], F. Censi[4], G. Calcagnini[4], E. Mattei[4], M. Triventi[4], P. Bartolini[4]

[1]Div. di Cardiologia, Osp. Sacco, Milano, ITALY, [2]Dip. del Cuore e Grossi Vasi, Università la Sapienza, Roma, ITALY, [3]Div. di Cardiologia, Osp. S. Pertini, Roma, ITALY, [4]Dip. Tecnologie e Salute, Istituto Superiore di Sanità, Roma, ITALY

Paroxysmal atrial fibrillation (AF) is a difficult disorder to investigate because of its intermittent and sometimes asymptomatic nature. It has been recently demonstrated that standard monitoring/follow-up methods for patients with paroxysmal AF have low sensitivity and specificity. Indeed, such routine methods are utilized by chance, regardless the actual duration and distribution of AF episodes. The follow-up/monitoring strategies usually adopted for a paroxysmal AF patient include sporadic ambulatory ECG control, sporadic 24h Holter, 7gg Holter or, for implanted patients, the continuous monitoring provided by implantable device. Objective follow-up strategies with repetitive, long-term, home monitoring devices are necessary to analyze rhythm outcome of a given therapy.
On the basis of the scientific data available and of socio-economic considerations, a efficient monitoring of the AF patients should allow a daily ECG monitoring of AF patient at home. Of course, care has to be paid to the correct timing of such monitoring, to increase the probability to detect AF episodes.
The limited data previously published regarding the daily distribution of AF onset are controversial. Almost all data showed that the onset of paroxysmal atrial fibrillation does not occur randomly.
The aim of this study was to investigate the daily temporal distribution of AF episode onset coming from patients enrolled in Burden II Study and implanted with DDD-CLS pacemaker for Brady-Tachy Syndrome. The data analysis was performed considering the mode switch list which includes date, time and duration of each mode switch episode.
AF onset times for the 24-hour period were divided into 48 30-minute periods. Chi-square tests for goodness of fit were used to determine whether there was a uniform distribution of AF episode onsets. AF episodes showed an onset pattern peaking at 9 AM and 1 PM. 59% of episodes occurred between 8 AM and 8 PM, with the least number of episodes occurring between 2:30 am and 6:30 am.
The patient population analyzed in the present study suggest a circadian rhythm of paroxysmal AF episodes, similar to that described for other cardiovascular diseases, with clustering of the majority of events in the morning starting from 8 AM and (to a lesser degree) in the afternoon (3pm-6pm).
Such data could be used to optimize the timing use of tele-monitoring devices which provide daily ECG recording at home and transmission to a clinical centre, in order to maximize the probability to detect AF episodes.

RADIOFREQUENCY ABLATION OF ATRIAL FIBRILLATION: IMPACT ON ENDOTHELIAL PROGENITOR CELLS AND OTHER HAEMOPOIETIC CELL POPULATIONS

D. MOCINI[1], F. Venditti[1], S. Ficili[1], M. Galeazzi[1], C. Lavalle[1], M. Russo[1], S. Dottori[2], A. Pandozi[1], C. Pandozi[1], M. Santini[1]

[1]Department of Cardiology, San Filippo Neri Hospital, Rome, ITALY, [2]Biosense Webster Italy, Johnson & Johnson Medical, Milan, ITALY

Background: Persistent atrial fibrillation (AF) and treatment with DC shock have shown to determine an increase in some specific subpopulations of mononuclear cells in peripheral blood.
Some data in literature suggest a possible arrhythmogenic effect of immature cells with stem cell characteristics.
Aim of the study: The aim of the study is to evaluate the behaviour of some cells lines with stem-like characteristics in the peripheral blood and to see if a correlation is present between the quantitative variations observed and the episodes of AF relapse during one year follow up.
Methods: Twenty-seven patients, with either persistent AF (8 pts) or parossistic AF (10 pts), resistant to combined pharmacological treatment, underwent transcutaneous radiofrequency ablation. Just before the procedure and 24 hours after, the white blood cell line population, the mononuclear cells and certain subpopulations of mononuclear cells were analyzed. The number of relapse during the first year of follow up were registered dividing the patients in two groups depending on the behaviour of two specific mononuclear

cells subpopulations(CD34+/CD133+; CD34+/CD/KDR+): Group 1: patients who had an increase which was less than the average; group 2: patients who had an increase which was greater than average.
Results: The main evidence which were demonstrated with our study were:

1) radiofrequency transcatheter ablation of atrial fibrillation is associated with an increase of white blood cells, of total mononuclear cells and of some specific subpopulations of mononuclear cells present in the peripheral blood.
2) Some of these populations increase only in an absolute sense (CD34+; CD133+; CD34-/CD133+; CD45+; CD34+/CD45+; CD38+; CD34+/CD38+).
3) Other populations of cells, such as the progenitor of endothelial cells, increase both in a relative and absolute sense (CD34+/KDR) with respect to the total mononuclear population.

In the group with a small increase of positive CD34/KDR cells 3 relapse of atrial fibrillation were observed during follow up whereas 5 were seen in the patients with elevated values of these same cells. In a similar way, if the patients were divided considering a high or low increase of positive CD34/CD133 cells, respectively 2 and 6 relapse of the arrhythmia were observed.

DIMENTIONAL ANALYSIS OF HEART RHYTHM VARIABILITY IN PATIENTS AFTER RADIOFREQUENCY ABLATION OF PAROXYSMAL ATRIAL FIBRILLATION

A. ARDASHEV, A. Shavarov, E. Zhelyakov, E. Dolgushina

Burdenko Head clinical hospital, Moscow, RUSSIA

Purpose: To determine the relation between nonlinear heart rate variability (HRV) and atypical atrial flutter (AFl) appearance in pts underwent radiofrequency catheter ablation (RFA) of paroxysmal atrial fibrillation (AFib).
Materials and methods: Forty-one paroxysmal AFib pts (8 women), 53.7±12.2 years of age, were included in the study. AFib history was 9.4±4.1 years. RFA was performed using CARTO-system. Atypical AFl was documented within the first 24 hours in 4 pts, 48 hours in 2 pts after RFA (6 pts in total). Quantitative characteristics of chaos we used as follows: parameters of informational dimension, fractal dimension (DF) and Lapunov parameters. They were determined based on consecutive 4000 R-R intervals of sinus rhythm recordings before RFA, 2 hours, 6 hours, 24 hours, 2 and 6 months after RFA.
Results: 2 hours after RFA DF value was significantly lower in pts with atypical AF comparing to pts without postincisional arrhythmias (2.24±0.06 vs 2.68±0.14, $p<0.05$). There were no significant differences among standard HRV measurements, information dimension and Lapunov parameter between the subgroups.
Conclusions: fractal dimension might be considered as an instrument to predict appearance of atypical AFl in post-RFA AFib pts.

CONTROL OF VENTRICULAR RATE RESPONSE BY ENDOCARDIAL VAGAL STIMULATION IN HUMANS WITH CHRONIC LEADS

S. BIANCHI[1], P. Rossi[2], A. Della Scala[3], G. Monari[4], L. Kornet[5], P. Azzolini[1]

[1]S. Giovanni Calibita Fatebenefratelli Hospital - Cardiology Dpt, Roma, ITALY, [2]Belcolle Hospital - Medicine Dpt - Electrophysiology Unit, Viterbo, ITALY, [3]Medtronic Italy, Sesto S. Giovanni, ITALY, [4]ENEA, Frascati, ITALY, [5]Medtronic BRC, Maastricht, THE NETHERLANDS

Background: From posteroseptal atrial site, vagal fibers innervating the AV-node can be selectively stimulated (AVNS) with high frequency stimulation (HFS) to produce a significant reduction of ventricular rate during AF. We hypothesized that this region could represent both an optimal pacing site and allow persistent AVNS.
Methods: In 16 consecutive patients candidate to dual chamber or biventricular ICD implant and with a history of paroxysmal AF, a standard screw-in atrial lead was implanted in the posteroseptal area, where an advanced AV block was achieved during HFS. Devices able to perform 50 Hz in-hospital atrial stimulation were implanted. At implant and at a mean follow-up of 2.5 months (standard deviation: ±40 days), HFS was delivered to demonstrate that a gradual control of AV nodal response could be achieved until complete block.
Results: At implant, ventricular response was slowed until complete AV block, which was obtained with a mean amplitude of 6.1V±1.8 (0.2ms, 50 Hz). A 25% reduction of mean V-rate was obtained with 4.3V±1.6. Atrial pacing threshold was 1.1V±0.3 at 0.5ms and P-wave amplitude was 2.2mV±1.1, with a far-field R-wave of 0.4mV±0.4. Eleven patients already reached the 2-month follow up: electrical characteristics both related to pacing and to AVNS were not significantly different from baseline.
Conclusions: Endocardial AVNS seems a feasible and effective technique to decrease mean VR during AF in a chronic setting. This integrated therapy opens up a wide range of new diagnostic and therapeutic possibilities.

PROGNOSTIC VALUE OF PNN50 FOR ATRIAL FIBRILLATION IN PACEMAKER IMPLANTED PATIENTS: PRELIMINARY RESULTS

G. MOLON[1], S. Cerisano[2], G.B. Del Giudice[3], D. Rossi[4], G. Castellani[5], A. Boncompagni[6], A. Curnis[7], on behalf of 3P Investigator Group

[1]Ospedale Sacro Cuore, Division of Cardiology, Negrar, ITALY, [2]Arcispedale S. Maria Nuova, Division of Cardiology, Florence, ITALY, [3]Ospedale S. Giovanni Addolorata, Division of Cardiology, Rome, ITALY, [4]Ospedale Nuovo S. Giovanni di Dio, Division of Cardioloy, Florence, ITALY, [5]Ospedale S. Salvatore, Division of Cardioloy, L'Aquila, ITALY, [6]Sorin Group, Milan, ITALY, [7]Spedali Civili, Department of Cardiology, Brescia, ITALY

Introduction: Atrial fibrillation (AF) is a major clinical problem. It has been reported the prevalence of AF in pacemaker implanted patients (PM) is higher than the general population.
Aim of 3P study is to evaluate the behaviour of autonomic central nervous system (ACNS) in PM patients both without and with documented AF. Sympathetic/parasympathetic balance has been evaluated over 13 months using pNN50.
Methods: 100 new-PM patients (58 male, mean age 76±7) with a PM Neway D/DR (Sorin Group) and no previous AF history have been followed for 13 months.
pNN50 monthly mean and AF status have been recorded. Only data from last 12 months have been used. At the end of the study patients have been split in Group 1 (no AF) and Group 2 (AF, with at least 5 AF of at least 1 hour each). We have evaluated the CNS activity in term of pNN50 yearly mean and quantified its complexity with approximate entropy (ApEn) of pNN50 monthly means. ApEn is a regularity statistic index: repetitive pattern has small ApEn, whereas chaotic process has higher ApEn.
Results: 68 patients have been assigned to Group 1 and 32 to Group 2. pNN50 yearly mean was 14.04±14.90 for Group 1 and 12.40±11.96 for Group 2. Student's T-Test shows no statistical difference between the pNN50 yearly means. Conversely we found a statistical difference for the two standard deviations (F-Test, $p<0.0001$), with higher value for Group 1. We evaluated the complexity and regularity of pNN50 monthly means using ApEn. Calculated ApEn are 0,19848 for Group 1 and 0.03165 for Group 2.
Conclusion: Data show for AF-free patients an ApEn higher than patients with AF. These data lead to the conclusion that the ACNS activity is more regular in patients who will develop AF and more chaotic in AF-free patients. These results should be confirmed in larger pts cohorts.

UTILITY OF INTRAOPERATIVE DEFIBRILLATION THRESHOLD TESTING DURING IMPLANTABLE CARDIOVERTER-DEFIBRILLATOR INSERTION

D. DUGO, R. Arancio, E. Puzzangara, A. Di Grazia, C. Liotta, G. Licciardello, C. Tamburino, V. Calvi

Cardiology Department, Ferrarotto Hospital, Catania, ITALY

Purpose: The assessment of defibrillation efficacy using a safety margin of 10J has long been the standard of care for insertion of implantable cardioverter-defibrillator(ICD), but physicians are concerned about complications related to induction test, so the need for testing has been recently questioned. The aim of our study was to assess the impact of defibrillation threshold(DFT) testing of ICDs on survival and to verify efficacy of ICD therapy.

Materials and methods: In our retrospective analysis 111 patients were included, who received ICD between January1997 and May2007. 45 patients had intraoperative defibrillation safety margin testing(PTD, 64±11.6 years, mean ejection fraction (EF) 31.5±11.7%, 35 male, mean shock energy 18.6±2.6J), while 66 had no test (PNTD, 61.6±11.1 years, mean EF 26.8±8.5%, 63 male).After implantation all patients were evaluated at month 1-3-6, then every six months. We compared the outcome(success of ICD therapies against spontaneous ventricular tachycardia (VT)/ventricular fibrillation (VF) events and survival) of the two groups of patients and also the presence of arrhythmic events not treated by ICDs.

Results: During 64±29 months follow-up for PDT and 26.2±20.6 months for PNDT, percentage of mortality (PDT 8.9%, PNDT 6.1%, p=0.7), unappropriate shock (PDT 8.9%, PNDT 6.1%, p=0.7) and success of the first delivered shock for VT/VF (PDT 100%, PNDT 96.7%, p=0.2) were similar in both groups; only two of PNDT needed a second delivered shock for a VT. Besides, in both groups the most frequent arrhythmia was VT(PDT 94.5 %, PNDT 98.9%), very often successfully interrupted by antitachycardia pacing, with a reduction of the need of delivered shock (12.26% PDT, 19.93% PNDT).In both groups there weren't arrhythmias not treated by ICDs.

Conclusions: Our experience has shown that not to perform DFT testing not only simplifies ICD implantation and avoids complications related to VF induction, but also doesn't involve a worse outcome. However, a prospective randomized study of DFT testing is warranted.

EVALUATION OF DIFFERENT TECHNIQUES IN VENTRICULAR FIBRILLATION INDUCTION IN PATIENTS WHO GOT ICD

M. ZEMLYANOVA, A. Semagin, M. Mazilov, J. Tracht, S. Khokhlunov

The State Clinical Cardiological Dispensary, Samara, RUSSIA,

Objectives: Our study was designed to explore efficacy and safety of different techniques in intraoperative induction of ventricular fibrillation (VF).

Methods: 20 patients, middle age 43.6±17.3, who underwent successful implantation ICD were included in the study. All patients have 1 or more events of sudden cardiac death (SCD). Etiology factors of SCD were: coronary disease in 18 cases, long QT-syndrome – 1, ventricular septal defect – 1patient. Ventricular tachycardia (VT) was recorded in 12 cases, VF – 8 cases; 7 patients underwent CABG. Low ejection fraction had 11 patients. During intraoperative testing we were analyzing two techniques of VF induction: HF Burst and T- wave shock.

Results: We started to induce VF by T- wave shock. Only 2 patients got sustained VF (13 sec.) inducing by T- wave shock 1J from the first time. Twice we used T- wave shock 1J in two cases. We got VF 15.6±2.1 sec.

When we used T- wave shock 2J 1 patient got VF (16 sec.) from the first time and twice we used T- wave shock 2J in 1 case. We couldn't induce VF (4.1±2.4 sec) by T-wave shock in 15 (75%) cases. Average number of VF inducing attempts was 2.8±0.9 per patient. In this way sustained VF (13.5±2.1 sec.) were induced by HF Burst (30 Hz/2 sec.) in 9 cases, HF Burst (30 Hz/3 sec.) – in 6 cases.

We noted that T- wave shock was ineffective when the ejection fraction was saved (>50%). Viceversa it was working when the ejection fraction was low.

Conclusions: HF Burst was more effective and safety technique for VF inducing;, HF Burst induced sustained VF in all cases from the first time; For increasing effectiveness, minimization patient s trauma and reducing intraoperative testing time it is rational to start VF induction from HF Burst technique.

DO PATIENT CHARACTERISTICS INFLUENCE THE DECISION TO PERFORM DEFIBRILLATION TESTING AT THE TIME OF ICD IMPLANT? PRELIMINARY DATA FROM SAFE-ICD STUDY

M. BRIGNOLE[1], D. Oddone[1], M. Gasparini[2], S. Iacopino[3], E. Occhetta[4], A. Vado[5], L. Calò[6], A. Proclemer[7], M.G. Bongiorni[8], G. Raciti[9], G. Buja[10]

[1]Ospedali del Tigullio, Lavagna, ITALY, [2]Ist. Clinico Humanitas, Rozzano, ITALY, [3]Casa di cura S. Anna, Catanzaro, ITALY, [4]A.O. Ospedale Maggiore della Carità, Novara, ITALY, [5]Osp. S. Croce e Carle, Cuneo, ITALY, [6]Policlinico Casilino, Roma, ITALY, [7]A.O. S. Maria della Misericordia, Udine, ITALY, [8]Ospedale Cisanello, Pisa, ITALY, [9]Boston Scientific, Segrate, ITALY, [10] Policlinico Universitario, Padova, ITALY

Background: Despite an effective defibrillation test (DT) is considered mandatory during implantation of ICDs, some physicians are concerned about the risk of complications related to this intra-operative test. The aim of the SAFE-ICD study is to evaluate the safety of two strategies consisting in performing or not performing DT during first implantation of ICD.

Aim: 1) To analyze differences between patients who performed or not DT during ICD implantation in the centers participating to SAFE-ICD study; 2) find clinical variables predictors of the decision to avoid DT.

Methods and results: In 31 centres 478 consecutive first implants of ICD were considered between April and August 2008. Patient characteristics were: male gender: 82%, ischemic disease: 52%, ejection fraction <=30%: 65%, primary prevetion: 68%; NYHA class >II: 42%, age >70: 46%, cardiac resyncronization therapy (CRT): 45%. The decision to perform or not DT in each center was done according to clinical practice. In 269/478 patients (57%) DT at implant was not done. Most clinical characteristics did not differ between patients performing or not DT: at multivariate analysis only patients with NYHA class >II were associated a higher probability of not performing DT (OR: 2.24; 95% IC: 1.40- 3.59; p<0.01).

Conclusions: In the SAFE-ICD study DT is not performed in a substantial number of patients. The decision to avoid DT is not influenced by most clinical characteristics, except for NYHA class >II, suggesting that decision to perform DT during implant is mostly related to center's clinical practice. The SAFE-ICD study will assess safety of this practice.

COMPLICATIONS, MORBIDITY AND MORTALITY IN 377 CONSECUTIVE PATIENTS WITH IMPLANTABLE CARDIOVERTER DEFIBRILLATORS

S. IACOPINO[1], A. Talerico[1], G. Fabiano[1], P. Sorrenti[1], G. Campagna[1], G. Musolino[1], A. Polimeni[2], G Colangelo[1]

[1]Sant'Anna Hospital, Catanzaro, ITALY, [2]Magna Graecia University, Catanzaro, ITALY

Background: The implantable cardioverter defibrillators (ICDs) are increasingly being used as a treatment modality for life threatening tachyarrhythmia.
Aim: The purpose of this study was to define the frequency of complications rates including appropriate and inappropriate ICDs therapy, morbidity and mortality in large patient cohorts.
Methods: The data of 377 consecutive patients who underwent first implantation of an ICD for primary or secondary prevention of sudden cardiac death were prospectively analyzed.
Results: Including 2-year follow-up, one hundred and seventy six (46.7%) of patients had an intervention of ICD, 38.7% had appropriate ICD therapies, 12.3% had inappropriate therapies. The frequency of lead-related complications (dislodgment) was 2.6%, lead fracture or lead insulation defect was 1.3%. One ICD system infections necessitating device removal (0.2%). The risk of complications did not have any statistically significant difference in secondary versus primary prevention groups (p=0.09). Seventy two hospital readmissions were recorded, 52.2% for arrhythmias, 5.3% for arrhythmic storm, 10.1% for congestive heart failure symptoms, and 2.7% for perioperative complications. The 2-year survival rate was 95.7%. Predictors of mortality were NYHA class III or more (p<0.001), age >65 years (p=0.01), LVEF <30% (p<0.001), and serum creatinine >125 microM (p<0.006).
Conclusions: Complication types and rates may be affected by numerous variables, including operator experience, patient comorbidities, and medical therapies. In large patients cohorts with ICDs, 2-year survival rate is high.

REPLACEMENT OF ACE-INHIBITORS WITH LOW DOSE ANGIOTENSIN RECEPTOR BLOCKERS WORSENS THE ARRHYTHMIC PROFILE IN ICD RECIPIENTS WITH HEART FAILURE

P. FRANCIA, A. Uccellini, C. Balla, A. Ricotta, A. Modestino, A. Salvati, M. Volpe

Cardiology, 2nd Faculty of Medicine, University La Sapienza, St. Andrea Hospital, Rome, IT, Rome, ITALY

Background: Implantable cardioverter-defibrillators (ICD) prevent sudden death (SD) in patients with ischemic and non-ischemic severe left ventricular dysfunction. In this prospective single-center analysis, we sought to identify the role of medical therapy on appropriate ICD interventions in heart failure (HF) patients implanted for primary prevention of SD.
Methods: Sixty-nine patients received an ICD between April 2003 and April 2008 and had complete baseline clinical, laboratory, echocardiographic information and follow-up. Follow-up was computed from the date of device implantation to the time of first ICD therapy, date of death, or July 2008, whichever came first. Predictors of first ICD intervention were derived from Cox proportional-hazards regression analysis.
Results: Median age was 65 y (21-81), and 60 patients (87%) were males. HF etiology was ischemic in 59% of patients and non-ischemic in 41%. NYHA class was I in 26% of patients, II-III in 71%, and IV in 3%. Median EF was 29% (12-50), and 39% had LBBB. Major comorbidities were diabetes (33%), hypertension (54%), atrial fibrillation (20%), and renal insufficiency (22%). Patients were on medical treatment with beta-blockers (83%), ACE-i (65%), angiotensin receptor blockers (ARB, 32%), diuretics (88%), spironolactone (54%) and amiodarone (20%).
After a mean follow up of 17±14 months, 17 patients (25%) had at least 1 appropriate ICD intervention, while 7 (10%) had died from cardiovascular causes. Patients with and without ICD interventions were comparable for all baseline variables except for higher use of ARBs in patients with appropriate ICD therapies (p=0.05). In univariable analysis, syncope (HR 2.7; p=0.08) and ARB therapy (HR 2.4; p=0.06) were the only predictors of ICD intervention with a significance level <0.1, while higher hematocrit had a protective effect (HR 0.9; p=0.08). In multivariable analysis, therapy with ARBs was the single borderline significant independent predictor of ICD intervention (HR 2.6; 95% CI: 0.9-7.0; p=0.05). Nineteen out of 22 patients (86%) treated with ARBs were not on ACE-inhibitors, and 68% were on losartan with a mean daily dose of 49±24 mg.
Conclusions: Replacement of ACE-inhibitors with low dose ARBs may worsen the arrhythmic risk in ICD patients with HF. Further studies on the arrhythmic profile of HF patients treated with high doses of ARBs are warranted.

ROLE OF CORONARY SINUS ISOLATION DURING RADIOFREQUENCY ABLATION IN CHRONIC ATRIAL FIBRILLATION PATIENTS

A. ARDASHEV, E. Zhelyakov, A. Shavarov, M. Rybachenko

Burdenko Head clinical hospital, Moscow, RUSSIA

Purpose: To compare mid-term results of circumferential RFA and circumferential ablation added to coronary sinus (CS) RF-isolation in chronic atrial fibrillation (AFib) patients (pts).
Material and methods: Guided by CARTO system 59 consecutive pts (10 women, 58.2±11.6 years of age) with permanent AFib underwent RFA. Chronic AFib history was 4.3±3.7 years (from 1 year to 17 years). In the first group included 29 pts RFA of left atrium was supplemented with RF-application from distal (12-1 clock on LAO view) to proximal (5-6 clock on LAO view) portion of CS. Second group consisted of 30 chronic AFib pts without CS isolation. There were no differences in age, gender, arrhythmia anamneses among pts of both groups. All pts received III class antiarrhythmic drugs before and 3 mos. after RFA. We compared occurrence of "first month arrhythmias", recurrence of arrhythmia and incidence of re-do procedures in both groups. Follow up (14.4±4.1 mos.) consisted of 24 hours ECG monitoring in all pts 2, 6 and 12 mos. after RFA.
Results: "First month arrhythmias" (atypical atrial flutter (AAF), focal atrial tachycardia, allorhythmic atrial premature activity) after primary RF-ablation session were manifested in 8 (28%) pts of the first group and 9 (30%) pts of the second group. Recurrences of arrhythmia were revealed in 7 (24%) pts of the first group (AAF – 5 cases, atrial premature depolarization – 2 cases) and 6 (20%) pts of the second group (AAF – 3 cases, focal atrial tachycardia – 1 case). Effective re-do RFA was performed in 5 pts of the first group (AAF – 4 cases, focal atrial tachycardia – 1 case) vs 5 pts of the second group (AAF – 5 cases).
Conclusion: There were no significant differences in mid-term results of circumferential ablation and circumferential ablation added to coronary sinus RF-isolation in chronic AFib pts.

ACUTE COMPLICATION RATE WITH THE ROBOTIC NAVIGATION FOR CATHETER ABLATION OF ATRIAL FIBRILLATION: THE WORLDWIDE EXPERIENCE

L. DI BIASE[1], W. Davies[3], R. Horton[2], J. Sanchez[2], J.G. Gallinghouse[2], J.D. Burkahardt[2], J. Zagrodzky[2], A. Natale[2]

[1]Texas Cardiac Arrhythmia Institute, University of Texas, Austin, USA, [2]University of Foggia, Foggia, ITALY, [2]Texas Cardiac Arrhythmia Institute, Austin, USA, [3]Waller Cardiology Department, Imperial College and St. Mary's Hospital, London, UK

Introduction: The Hansen robotic system has recently been used for mapping and navigation during catheter ablation procedures in the atrial chambers. This system consists of a 14 French (F) outer sheath, and an 8 F inner robotic sheath manipulated via a remote station. Since this is relatively new technology information on safety are warranted. We report the worldwide experience in catheter ablation of atrial fibrillation (AF).
Methods: 601 consecutive patients underwent catheter ablation using the robotic system. Of them 466 patients were treated for atrial fibrillation. Data were prospectively collected, including intra-operative, early and late complications.
Results: Out of the 466 undergoing AF ablation, 364 were paroxysmal, 76 persistent and 16 permanent respectively. The remaining 115 patients underwent supraventricular arrhythmias ablation (83 flutters, 23 AVNRT and 9 WPW respectively).
There was no procedure-related mortality. Vascular complications were reported in 0.7% of patients and in 1.3% of patients periricardial effusion occurred intra-operative or early after the procedures. Late complications were observed only in 4 patients (0.5%) and included 2 pericarditis, 1 gastroparesis and 1 moderate pulmonary vein narrowing. Most complications occurred during the early period of the learning curve.
Conclusions: Hansen Robotic navigation demonstrated to be safe both for mapping and ablation in the left atrium. Complication rate appeared similar to what reported in the literature with manual catheter ablation.

PRELIMINARY RESULTS OF PROSPECTIVE COMPARISON OF LEFT ATRIAL VERSUS BIATRIAL CATHETER ABLATION FOR LONGSTANDING PERSISTENT ATRIAL FIBRILLATION

M. FIALA, J. Chovancik, D. Wojnarova, V. Bulkova, J. Gorzolka, R. Neuwirth, R. Nevralova, O. Jiravsky, J. Januska, M. Branny

Hospital Podlesi, Department of Cardiology, Trinec, CZECH REPUBLIC

Aims: Ability to restore sinus rhythm (SR) by ablation and medium-term outcome in patients with longstanding persistent atrial fibrillation (AF) undergoing left atrial (LA) ablation vs biatrial (BA) ablation were compared.
Methods: Of the 70 patients (pts) (58±9 years, persistent AF 34±23 months), 35 pts had complex LA ablation (group 1), and 35 pts had biatrial ablation (group 2). LA ablation consisted of pulmonary vein (PV) isolation + LA linear lesions + cavo-tricuspid isthmus ablation + possible CS ablation; BA ablation, in addition, included inter-caval linear and septal lesions. The AF/AT burden after single ablation till the end of the follow-up (F-U) or repeat ablation was assessed from the patients` diary, regular standard and Holter ECGs, and 3-week ECG telemonitoring.
Results: In groups 1 vs 2, AF was converted into tachycardia (AT) in 21 (60%) vs 24 (69%) pts, and SR was restored in 17 (49%) vs. 17 (49%) pts; right septal ablation converted AF into AT or restored SR in 4, resp. 3 pts. At the end of 12±7 months F-U, and after repeat ablation in 17 (49%) vs 8 (23%) pts (P=0,18), 29 (83%) vs 28 (80%) pts remained in SR. The AF/AT burden after single ablation was 3889 (40%) of 9785 F-U days vs 2179 (25%) of 8812 F-U days (P<0.001).
Conclusion: Additional right atrial lesions facilitated SR restoration in 24% of pts with BA ablation, although the proportion of the pts with restored SR was not different. BA ablation was associated with trend to fewer repeat ablations, and with significantly lower postablation AF/AT burden.
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DIFFERENT ATRIAL FIBRILLATION ABLATION METHODS IN PATIENTS WITH DIFFERENT NUMBER OF TRIGGERING ECTOPIC FOCI: WHAT IS BETTER?

E. MIKHAYLOV, S. Gureev, V. Marinin, V. Orshanskaya, D. Lebedev

Almazov Heart, Blood and Endocrinology Centre, Saint-Petersburg, RUSSIA

Purpose: To perform retrospective analysis of paroxysmal atrial fibrillation ablation (PAF) effectiveness by ostial PV ablation (OPVA) or by circumferential PV isolation (CPVI) in patients with different number of atrial triggering foci.
Methods: 36 patients were included. Before ablation 12-lead Holter monitoring was performed in all patients without antiarrhythmic drugs. Holter data were processed and early P on T premature contractions were analyzed with T-wave subtraction. Then ectopic P-waves were classified as one of the following types: LSPV, LIPV, RSPV, RIPV, CS ostium, SVC, IVC, non-differentiated. OPVA was carried out in 15 patients (52±7 years old), CPVI was performed in 21 patients (54±6). Co-morbidity, PAF history, left atrial dimension were comparable in two groups.
Results: In OPVA group 4 different foci were revealed in 1 patient, 3 types – in 6 patients, 2 types – in 5 patients. 1 type – in 2 patients. Among group of CPVI 4 types of triggering foci were revealed in 2 patients, 3 types – in 6 patients, 2 types – 10 patients, 1 type – 3 patients. Follow-up period was 20±5 (18-36) months in group of OPVA and 16±6 (5-22) months in group og CPVI. Linear correlation was revealed between number of ectopic foci and number of patients with recurrence of PAF after OPVA. 100% success rate was revealed in patients with 1 type and 80% in patients with 2 types. In CPVI group there was no such correlation, but two patients with 1-2 types undergo redo procedure due to new atrial tachycardias.
Conclusions: CPVI was more effective, but in patients with only 1 or 2 triggering sites OPVA resulted in 80-100% success rates. In patients with 1-2 ectopic sites and CPVI procedure, second procedures were required due to new atrial tachycardias.

SEGMENTAL PULMONARY VEIN ISOLATION WITH POINT BY POINT ABLATION VERSUS THE ONE-SHOT ABLATION TECHNIQUE WITH THE HIGH DENSITY MESH ABLATOR - SIGNIFICANT REDUCTION OF FLUOROSCOPY - AND PROCEDURAL TIMES

A. MEISSNER, G. Plehn, M. van Bracht, R. Borchard, P. Maagh, M. Christ, T. Butz, M.O. Schrage, H.J.Trappe

Department of Cardiology and Angiology, Ruhr-University, Bochum, Germany

Background: Interventional therapy of atrial fibrillation (AF) is often associated with long examination - and fluoroscopy times.
Objectives: The purpose of this prospective study was to evaluate fluoroscopy- and procedural times of segmental pulmonary vein isolation (SPVI) using the high density mesh ablator (HDMA), a novel single, expandable electrode catheter for both mapping and radiofrequency (RF) delivery in comparison to irrigated point-to-point ablation around an only mapping catheter, the high density mesh mapper (HDMM).
Methods: The HDMA study group consists of 26 patients (pts), 14 (53.8%) with paroxysmal AF (PAF), 12 (46.2%) with persistent AF. SPV isolation via the HDMA was performed using a customized pulsed RF energy delivery program. The HDMA study group consists of 72 pts, 47 (65.2%) with PAF, 12 (16.7%) with persistent and 13 (18.1%) with permanent AF. SPVI was performed by irrigated ablation around the HDMM on the atrial side of the PV. All pts were investigated during conventional fluoroscopy.
Results: In the HDMA study group SPVI was achieved with a mean of 3.25±1.4 RF applications for a mean of 603±185 sec. Entrance conduction block was obtained in >94% of all PV. Mean total procedure and fluoroscopy time was 159±32 min and 33.5±8.6 min respectively.
In the HDMM study group the endpoint entrance-, and exit block was achieved in 93% and 81% respectively. Mean total procedure and fluoroscopy time was 235±41 min and 62.5±14.7 min respectively. Hence, point by point ablation required both significant longer procedural and fluoroscopy times compared to the new HDMA technique ($p<0.01$).
Conclusions: Comparing SPVI using with point-by-point ablation around the diagnostic only HDMM catheter versus the mapping and ablating HDMA catheter in a single unit both yields to good primary success rates. The HDMA simplifies the complex procedure of AF ablation, favorably impacting procedure and fluoroscopy times.

AUTOMATIC DETECTIONS OF FRACTIONAL ATRIAL ELECTROGRAMS INCREASE THE SUCCESS OF RADIOFREQUENCY ABLATION IN PATIENTS WITH PERSISTENT ATRIAL FIBRILLATION

A. COLELLA[1], M. Giaccardi[2], C. Liccardi[1], G.F. Gensini[1]

[1]Dept. Heart and Vessels-AOU Careggi, Firenze, ITALY, [2]Dept. Cardiovascular Rehabilitation, Don Gnocchi Foundation, Firenze, ITALY

Background: Radiofrequency catheter ablation of atrial fibrillation (AF) guided by complex fractionated atrial electrograms (CAFE) has been reported to eliminate AF in a large proportion of patients, especially in patients with chronic AF. The aim of this study was to investigate the role of automatic detections of CAFE with a new algorithm and the efficacy of radiofrequency ablation of this potentials.
Methods: In 20 patients (mean age, 63.05±5.83 years) with chronic AF (mean duration 8.25±2.27 months), radiofrequency ablation was performed in group A (n=11) to target disconnection of the pulmonary veins and to performed atrial lineal lesion on posterior wall of left atrium, left and right isthmus and in the group B (n=9) was associated to target automatic recognition (EnSite® St. Jude Medical) and ablation of CAFE in left and right atrium.
Results: After 6 months of follow-up after a single ablation procedure, 8/9 (88%) of Gr. B patients were in sinus rhythm, while only 5/11 (45%) of Gr. A were in sinus rhythm ($p<0.05$).
Conclusions: A good short-term efficacy is achievable with radiofrequency ablation of chronic AF guided by automatic complex fractionated atrial electrograms detection.

ADVANTAGES AND CAVEATS OF MANAGED VENTRICULAR PACING ALGORITHM. COMPARISON WITH SEARCH AV PLUS IN A SINGLE CENTER RANDOMIZED CROSS-OVER TRIAL

I. BERTOLOZZI, F. Bassano, A. Pucci

Cardiologia e Cardiostimolazione, Ospedale di Carrara, Carrara, ITALY

Introduction: Frequent and unnecessary right ventricular apical pacing (VP) may have detrimental effects including an increased risk of atrial fibrillation or congestive heart failure. New pacemaker algorithms to extend the AV interval have been created to reduce VP%. We compared two recent algorithms: managed ventricular pacing (MVP) wich automatically changes modes between AAI/R and DDD/R and Search AV Plus+ (SAV+), regarding tolerability and capability to reduce VP%.
Methods: 43 patients (62% males, age 75±8y) implanted with ADAPTA ADDR01 pacemakers (Medtronic) for symptomatic bradycardia (sinus node dysfunction 60%, transitory AV block 23%; others 17%) were randomized to 21 days treatment with SAV+ or MVP and then crossed over to the alternate pacing modality. The sensed and paced AV used during SAV+ were 120msec and 180msec respectively, with max offset parameter 170msec. The cumulative VP% was evaluated using Holter recordings of the device.
Results: The basal mean AS-VS interval was 217±62msec, the mean Wenkeback point (WP) was 125±34bpm, 40% of pt had WP<100bpm. The cumulative VP% was significantly reduced in MVP (11±23%,) compared with SAV+ (35±43, p<0.01). The difference of VP% was more evident in patients with impaired AV conduction (WP 88±14bpm; n=16): 32±30% in MVP vs 78±35% in SAV+ (p<0.001). During MVP but not during SAV+ 2 pts implanted for carotid sinus hypersensitivity reported dizziness (2/6 pts; ns). In these patients the carotid sinus massage induced AV block, MVP algorithm allowing one P wave non to be followed by QRS complex.
Conclusions: Compared with SAV+ the MVP significantly reduced VP% in patients with symptomatic bradycardia in particular if impairment of AV conduction coexisted. MVP could be an inappropriate option for patients with symptomatic cardioinhybitory carotid sinus hypersensitivity.

MINIMIZATION OF VENTRICULAR PACING IN CLINICAL PRACTICE: COMPARISON OF TWO AUTOMATIC ALGORITHMS

M. BRIEDA[1], F. Zoppo[1], L. Di Mattia[1], F. Del Bianco[1], E. Dametto[1], J. Comisso[2], L. Zago[2]

[1]Azienda Osp. S. Maria degli Angeli, Pordenone, ITALY, [2]Medtronic Italia, Milano, ITALY

Introduction: Different strategies have been recently implemented in Pacemaker in order to reduce the unnecessary right ventricular pacing (VP). In particular MVP and Search AV+ are two pacemaker algorithms specifically designed to reduce the percentage of VP. MVP is an atrial-based dual chamber pacing mode that combines functional AAI(R) pacing with ventricular backup DDD(R) pacing as needed, while Search AV+ applies a continuous search of right AV intervals to promote 1:1conduction.
Aim of the study: To compare the performance of these algorithms and their long-term effectiveness.
Methods: In our center 43 patients (36M; mean age 79+8y) were included in this analysis. All patients received a dual chamber pacemaker according to current guidelines. The primary indication was Sick Sinus Syndrome, associated to paroxysmal Atrial Fibrillation in 27 (62%) pts and I degree AV Block in 27 (62%). The mean EF% was 56+9 and 29 pts (67%) had a cardiomyopathy.
Results: An ADAPTA PM (Medtronic inc.) with MVP algorithm was implanted in 24 (56%) pts, while a, Enpulse PM with Search AV+ algorithm was implanted in 19 (44%) pts.
The mean FU was of 22+13months. The mean Atrial pacing was comparable in the two groups (64+35% vs 57+28 %, p=ns), whereas the mean VP significantly differs in the 2 groups (16+31% vs 38+42%, p=0.048). No pts in the MVP group developed a II degree AV Block, while 7 pts in the search AV group presented II degree AV block (p<0.05). The III degree AV Block was presented in 1 pt in the MVP group and in 2 pts in the Search AV group.
Conclusions: The MVP algorithm reduces significantly the VP% maintaining the AP% respect to Search AV algorithm in a real SSS population. Both algorithms were clinically very well tolerated by the patients, No adverse events were reported in the follow-up.

AUTOMATIC VS MANUAL PACING THRESHOLD MEASUREMENTS ANALYSIS IN DUAL-CHAMBER PACEMAKERS

J. BENEZET[1], J. Ortega[1], J. Benezet jr.[1], M.M. García de Pablo[2], M. Martín[2]

[1]Hospital Gral. Ciudad Real - Arrhythmia Unit, Ciudad Real, SPAIN, [2]Medtronic, Madrid, SPAIN

Background: Medtronic Capture Management algorithm performs automatic measurements of pacing threshold and adjusts pacing output assuring capture and optimizing device longevity.
Objective: To assess agreement between automatic and manual pacing thresholds in dual-chamber pacemakers.
Methods: Manual and automatic pacing thresholds measurements were performed in 83 patients with a Medtronic EnPulse DR pacemaker, implanted and followed by the same investigator. Agreement between measurements was evaluated through Cronbach's alpha statistic.
Results: Eighty-three patients were followed during one year at implant, 1, 3, 6, 9 and 12 months visits. Manual threshold at 0.4 ms was 0.56±0.43 V in atrium and 0.56±0.33 V in ventricle, whereas automatic threshold was 0.54±0.39 V and 0.49±0.31 V respectively. Mean difference between atrial measurements was 0.024 V with a 95% confidence interval of (0.003, 0.045) and between ventricular measurements of 0.062 V and (0.048, 0.077) respectively. Cronbach's alpha was 0.918 in atrium and 0.972 in ventricle. Cronbach's alpha in atrium and ventricle were respectively 0.365 (0.775 once eliminated from analysis patients with lead problems) and 0.904 at implant, 0.972 and 0.984 at 1 month-visit, 0.976 and 0.959 at 3 months, 0.960 and 0.991 at 6 months, 0.921 and 0.951 at 9 months and 0.903 and 0.986 at 12 months. Far field signal was captured in 53% of atrial leads. No significant difference was observed according to model lead (p=0.281) or lead position (p=0.503).
Conclusion: It has been demonstrated that Capture Management algorithm is highly reliable in both heart chambers during all follow-up period for well allocated leads. Far field does not depend on atrial lead position nor its model.

CHRONIC PERMANENT HIS OR PARAHISIAN PACING THRESHOLDS INVESTIGATED WITH VENTRICULAR CAPTURE MANAGEMENT

D. CATANZARITI[1], F. Cantù[2], G. Vergara[1], P. De Filippo[2], J. Comisso[3], L. Manotta[3]

[1]S. Maria del Carmine, Rovereto, ITALY, [2]Ospedali Riuniti, Bergamo, ITALY, [3]Medtronic Italia, Milano, ITALY

Introduction: Permanent Direct His Bundle pacing (DHBP) or paraHisian pacing (PHP) has been utilized to improve ventricular synchrony during pacing. Maintaining capture is of concern in this alternative pacing location. Modern pacemakers employ automatic capture detection algorithms to monitor ventricular thresholds. We investigated the chronic pacing thresholds and algorithm performance in chronic HB placed leads.
Methods: Chronically implanted patients with DHBP/PHP were investigated. In pts with devices capable of Right Ventricular Capture Management (RVCM), Holter recordings were used to verify RVCM performance and assess presence of DHBP or PHP at the measured threshold. The type of HB capture morphology at threshold was compared to HB capture morphology in office and at programmed pacing amplitude. The long term threshold history was reviewed to assess chronic pacing threshold variation.
Results: Fourteen pts (10 Male) were investigated. Mean follow up time was 26 months (range 1-36 months). All pts had Medtronic SelecteSecure leads (#3830) for HB pacing. Indications for pacing were: 6 AV block, 2 AF/SND, and 6 Sick Sinus Syndrome. Pacing systems included 2 single, 7 dual, and 5 triple chamber pacemakers. Eight subjects had DHBP, 4 had PHP and 2 had inflow tract. Holter recordings were completed in 13 pts and verified consistent pacing morphology over 24 hours. Average pace-QRS time was 60 msec for DHBP, 20 msec for PHP and 42.5 msec for Inflow Tract. In the five pts with devices capable of RVCM, there was no difference between automatic thresholds and manual measurements (1.875V vs 1.91V).
Conclusions: RVCM is feasible in DHBP and PHP placed leads. Manual and automatic measurements were similar and RVCM accurately measured the chronic thresholds.

AUTOMATIC MANAGEMENT OF LEFT VENTRICULAR PACING OUTPUT: EFFECTIVENESS OF STIMULATION AND DEVICE LONGEVITY

M. BIFFI[1], M. Bertini[1], D. Saporito[1], M. Ziacchi[1], S. Stabellini[1], S. Valsecchi[2], V. Ricci[2], G. Boriani[1]

[1]Institute of Cardiology, University of Bologna, Bologna, ITALY, [2]Medtronic Italy, Rome, ITALY

Aim of the study: We used a CRT-D device with an algorithm for automatic verification of left ventricle (LV) stimulation in 20 patients to understand LV threshold variability, such as to provide hints to program the algorithm features. We also tried a setting to achieve 99% effective stimulation while maximising device longevity.
Methods: The LV output was programmed as threshold+0.5V; the upper limit of LV output adjustment was set 6V at programmed pulse width. The algorithm is insensitive to the strength of the pacing pulse, thus pulse width was conveniently programmed to minimise the use of voltage multipliers in all the patients. Follow-ups occurred at month 1, then every 3 months, for clinical assessment and manual threshold verification. The efficacy of this programming at long term was also evaluated by Holter validation of LV stimulation.
Results: Average follow up was 14±5 months (6-21). LV threshold showed no changes in 97% of consecutive days, whereas a 0.5V and 1V increase occurred respectively in 2.3% and 0.6%. Maximum variability of LV threshold was <=0.5V during 90% of the follow-up period. Our programming of LV output provided 99 to 100% effective stimulation in 18/20 patients, and 90% efficacy in 2 patients because of missed threshold measurements. A 25% increase of device longevity can be expected by this programming.
Conclusions: LV threshold variability is truly modest. Daily update of LV threshold should be improved to ensure 100% LV stimulation by a threshold+0.5V safety margin. Device longevity is maximised when LV stimulation occurs below battery voltage.

EVALUATION OF THE EFFECTS OF CARDIAC RESYNCHRONIZATION THERAPY BY CARDIOPULMONARY EXERCISE TEST

E. FILIPPINI, E. Barbaresi, S. Stabellini, L. Bacchi Reggiani, S. Specchia, G. Boriani, A. Branzi

Institute of Cardiology, University of Bologna, Bologna, ITALY

Purpose: Effects of Cardiac Resynchronization Therapy (CRT) by cardiopulmonary exercise testing (CPET) in patients with heart failure (HF) were been not much analysed during recovery phase of oxygen uptake (VO2).
Methods: 78 patients (59 M/19 F), 62±12 years, with dilated cardiomiopathy (52 idiopathic, 22 ischemic, 1 Becker's Dystrophy, 1 valvular, 1 TGV), in NYHA II-III, with LBBB, underwent a maximal CPET on an ergometer cycle (10 w/min) before and 3-5 months after biventricular pacemaker implant. The main parameters of the tests were compared with statistical analysis.
Results: Peak-VO2 increased from 16.0±4.5 ml/kg/min to 17.3±5.3 ml/kg/min ($p<0.008$); watts of work from 88.5±31,5 to 94.4±29.2 ($p<0.006$); peak-ventilation from 46.7±15.9 l/min to 50.7±18.0 l/min ($p<0.009$); systolic blood-pressure at peak from 137±22 mmHg to148±28 mmHg ($p<0,003$) and Ä rest to peak from 26±18 mmHg to 33±21 mmHg ($p<0.037$); heart rate at peak from 116±22bpm to 122±19bpm ($p<0,01$) and Ä rest to peak from 43±22bpm to 51±23bpm ($p<0.037$);VE/VCO2-slope reduced from 31.2±6.6 to 29.8±6.2 ($p<0.008$); and the recovery slope of VO2 at the first minute after exercise from –0.4±0.3 to –0.5±0.3 ($p<0.01$).
Conclusions: After implant of biventricular pacing, the main parameters during CPET showed the functional efficacy of CRT; in particular are interesting the VE/VCO2-slope reduction (prognostic value) and the faster VO2 recovery-slope (restoration of the oxygen consumption). Furthermore, 64% of patients improved their performance after CRT, in particular those affected by idiopathic cardiomiopathy (70%) more than those with ischemic diseases (50%). These results show that cardiopulmonary exercise test may be very useful for the evaluation of the efficacy of CRT in patients with heart failure.

MECHANICAL DYSSYNCHRONY AND CARDIAC RESYNCHRONIZATION THERAPY IN HEART FAILURE PATIENTS WITH A NARROW QRS COMPLEX

R. VAN BOMMEL[1], V. Delgado[1], C. Borleffs[1], M. Schalij[1], J. Gorcsan[2], J. Bax[1]

[1] *Leiden University Medical Center, Leiden, THE NETHERLANDS,*
[2] *The Cardiovascular Institute, University of Pittsburgh, Pittsburgh, USA*

Purpose: Current criteria for cardiac resynchronization therapy (CRT) recommend treatment only in patients with a wide QRS complex (>120ms). However, only 30% of heart failure patient demonstrate QRS prolongation. Furthermore, it has been demonstrated that also patients with a narrow QRS complex exhibit left ventricular (LV) mechanical dyssynchrony, as assessed with echocardiography. To further elucidate the possible beneficial effect of CRT in heart failure patients with a narrow QRS complex, a multicenter study on echocardiographic parameters of LV mechanical dyssynchrony and response to CRT in these patients was conducted.
Methods: A total of 123 consecutive heart failure patients with a narrow QRS complex (< 120 ms) undergoing CRT were included at 2 centers. Several widely accepted measures of mechanical dyssynchrony were evaluated: LV filling ratio (LVFT/RR), LV pre ejection time (LPEI), inter ventricular mechanical dyssynchrony (IVMD), opposing wall delay (OWD) and anteroseptal posterior wall delay with speckle tracking (ASPWD). Response to CRT was defined as a reduction greater than 15% in LVESV at 6 months follow-up.
Results: Measures of dyssynchrony in heart failure patients with a wide QRS complex can also be observed in patients with a narrow QRS complex. Nonetheless, mean extent of dyssynchrony is less in all evaluated measures and for LVFT/RR, LPEI and IVMD, presence of predefined, significant, dyssynchrony is less than 20%. With ROC curve analyses, both OWD and ASPWD demonstrated to be useful in predicting response to CRT in narrow QRS patients with a cutoff value of 75 ms and 107 ms, respectively.
Conclusion: Mechanical dyssynchrony can be widely observed in heart failure patients with a narrow QRS complex. Cutoff values for mechanical dyssynchrony, derived from wide QRS patients are also useful in narrow QRS patients but our analyses demonstrate that other possible cutoff values for dyssynchrony might be used in predicting response to CRT in these patients.

DAILY MONITORING OF PHYSICAL ACTIVITY AND HRV IN PATIENTS WITH CRT

A. COLELLA[1], G. Calcagnini[2], M. Giaccardi[3], C. Licciardi[1], F. Censi[2], P. Bartolini[2], G.F. Gensini[1]

[1] *Dip. del Cuore e dei Vasi, AOU Careggi, Firenze, ITALY,* [2] *Dip. Tecnologie e Salute, Istituto Superiore di Sanità, Roma, ITALY,* [3] *Cardiologia, Fondazione Don Gnocchi, IRCCS Università di Firenze, Firenze, ITALY*

Background: Previous studies showed that in symptomatic heart failure (HF) patients, Cardiac Resynchronization Therapy (CRT) determines an increase of long term Heart Rate Variability (SDANN - standard deviation of the 5-minute average R-R intervals) consistent with the improve of the patient clinical parameters, whereas a lack of increase identifies patients at highest risk for cardiovascular events and/or hospitalization. Activity is also a predictor of negative outcomes in these patients, although with a lower sensitivity/specificity, but the role played by the activity in the changes observed in the SDANN is not fully understood yet. New CRT devices calculate the SDANN as well as the activity and the Home Monitoring function allows daily access to the patient stored data. Aim of this study was to analyze the relationship between and the time course of SDANN and activity in HF patients newly implanted with CRT devices.
Methods: Twenty-four patients candidate to CRT according to the current guidelines were implanted with the Biotronik Lumax HFT. Data were collected daily by the Home Monitoring function and patients were considered eligible if atrial sensing was greater than 75% and no persistent atrial arrhythmias were present.
Results: Nine patients fulfilled the criteria. Increase in SDANN (1st month respect to baseline) was observed in 6/8 patients, activity increased in 9/9 patients. A significant positive correlation (i.e. increase in SDANN and increase in Activity) was found in 6/9 patients (0.44±0.09).
Discussion: In the majority of our patients, CRT determined a significant increase of SDANN and activity as evidenced by the daily monitoring of these parameters. However, the value of the correlation between SDANN and the activity suggests that, in HF patients, activity can only partly account for the changes of SDANN observed. This finding is consistent with the significant modifications of autonomic tone which occur in HF patients.
Conclusion: The availability of daily measures of SDANN and activity, provided by the Home Monitoring system, revealed that their

mutual relationship in HF patients is complex. The analysis of this correlation might unveil important prognostic information to be used to optimize the HF therapy.

CARDIAC RESYNCHRONIZATION THERAPY DEVICE CARRIER PATIENTS. NEED ALL AN ICD?

J. GONZALEZ MIRELIS[2], V. Castro Urda[1], I. Fernandez Lozano[1], J. Toquero Ramos[1], V. Mariona Montero[1], L. Nombela Franco[2], L. Pulpon Rivera[2]

[1]Hospital Universitario Puerta De Hierro/Department Of Arrhythmia, Madrid, SPAIN, [2]Hospital Universitario Puerta De Hierro/Department Of Cardiology, Madrid, SPAIN

Introduction: Cardiac resynchronization therapy (CRT) device implantation improves survival in patients with severe left ventricular dysfunction, a wide QRS and a deteriorated functional status. Some of these patients die without need for implantable cardioverter defibrillator (ICD) appropriate therapies. To add an ICD to CRT devices would not be necessary in these cases. We analyzed 131 patients with CRT device to compare a group of patients who died without receiving an ICD therapy and the rest of patients.
Results: In the total group, mean age was 59.1 years (SD 9.86). Mean ejection fraction (EF) was 23.5% (SD 7.71). Mean QRS width was 163.5ms (SD 25.67). An 87.5% were male. According to New York Heart Association, functional status was class II in 31.2% of patients, class III in 64.8% and class IV in 1.6%, at implantation time. Coronary artery disease (CAD) was present in 43.2% of cases and nonischemic dilated cardiomyopathy (DCM) in 53.6%. Primary prevention was the indication for ICD implantation in 72.8%. A 14.4% of patients presented atrial fibrillation (AF). There were 20 patients (15.3%) who died without the need for an ICD therapy. There were no significant differences between groups regarding age, sex, previous myocardial infarction, AF presence, EF or QRS width. Patients with a lower NYHA class had a higher rate of death without ICD therapy (60% of them were in NYHA class III or IV whereas, in the rest of patients, 71.3% were in NYHA class I or II, p 0.021).
Conclusion: Patients with a lower NYHA class have a higher risk of death without need for an ICD appropriate therapy. A larger patients sample would be necessary to obtain significant differences between groups in other variables.

CARDIAC CONTRACTILITY MODULATION AS ADJUNCTIVE THERAPY FOR CARDIAC RESYNCHRONIZATION NON-RESPONDERS

H. NAEGELE, S. Behrens, C. Eisermann

St. Adolfstift, Reinbek, GERMANY

Introduction: Cardiac resynchronization therapy (CRT) has become a standard therapy in cases of heart failure and asynchrony. Unfortunately, 20-30% of patients were non responsive (NR) to CRT. We used Cardiac Contractility Modulation (CCM) as an adjunctive measure in NR patients.
Methods: Sixteen NR patients, mean age 65±9 years, mean ejection fraction 27.3±7.4 % and New York Heart Association (NYHA) class III (n=9) or IV (n=7) despite CRT plus optimized medical therapy, received an additional CCM-implantation (OPTIMIZER III, Impulse Dynamics, USA). CCM delivers non-excitatory high-energy stimulatory impulses during the absolute refractory period, thus improving contractility (LV dp/dt). Acute LV dp/dt changes induced by CCM stimulation were measured by 5F Millar catheters placed in the LV during the implantation procedure. Patients were followed prospectively.
Results: LV dp/dt increased in every patient from a mean of 568 ± 153 to 646±147 mmHg/sec. (+14%, p<0.001) in the acute intraoperative testing. We noted the following complications and events during a follow-up of an average of 88±82 days (range 8-261) after CCM: intraoperative ventricular flutter needing cardioversion (n=1), atrial lead dislocation (n=1), CS lead dislocation (n=1), painful stimulation requiring repositioning of septal leads (n=1), true defibrillator shocks (n=2), cardiac decompensations (n=3), atrial fibrillation (n=2), renal failure (n=1) and pneumonia (n=2). NYHA class improved from 3.4 to 2.7 (p<0.01), and the ejection fraction increased from 27.3±5 to 31.1ƒnƒn±bƒn 6 (p<0.01). All patients could be discharged home. No electrical interference was observed between the CCM and CRT systems, and in particular, at no time was the CRT-ICD found to be delivering inadequate shocks.
Conclusion: The CCM method is feasible and could be applied with calculated risks as a possible useful adjunct in CRT-NR when no other options are available.

MAGNETICALLY GUIDED LEFT VENTRICULAR LEAD IMPLANTATION BASED ON IMAGE INTEGRATION OF ANGIOGRAPY AND 3-D CT RECONSTRUCTION OF THE CORONARY SINUS

M. TABORSKY[1], P. Neuzil[1], J. Vymazal[1], J. Adla[2]

[1]Na Homolce Hospital, Prague 5, CZECH REPUBLIC, [2]Motol Hospital, Prague 5, CZECH REPUBLIC

Background: Left ventricular (LV) lead placement is a critical part of successful cardiac resynchronization therapy (CRT). We hypothesized that LV lead implantation is feasible using remote magnetic navigation of guidewire (Stereotaxis, St. Louis, USA) based on image integration of minimum 2 angiographis views and 3-D CT reconstruction of coronary sinus (CS).
Objectives: 1. to evaluace the performance of image integration to reproduce the anatomy of CS and cardiac veins 2. to evaluace the efficacy of remote navigation of a magnetic guidewire within the CS based on this reconstruction.
Methods: In patients indicated for CRT a CT 3-D reconstruction of CS was performed and imported to the Stereotaxis software. Accuracy of the reconstruction was evaluated. Based on the reconstruction magnetic navigation vectors were selected to place guidewire to the target vein.
Results: 27 consecutive patients indicated for CRT were included. In 2 cases there was on CT only CS reconstructed with the absence of lateral/posterolateral veins. In 25 pts the image integration of CT and CS venogram (LAO and RAO projections) was realized. The quality of reconstruction was excellent in 21 [84%] and poor in 4 [16%]. In all 21 pts with optimal reconstruction the introduction of magnetic guidewire was successful based on selected vectors. In 2 cases manual modification of the vectors was required and in 1 case the image integration was not performed due to suboptimal CT CS reconstruction. The LV lead fluoro time for cannulation of the target vein was 1.1±1.8 min, total fluoro time 18±14min and implant time 96±21min.
Conclusions: Magnetic navigation system allows based on image integration of CT and CS angiography safe and precise navigation of a guidewire within CS and cardiac veins using selected vectors. However, the efficacy of this approach is infuenced by the quality of CT scans and requires further study.

CORONARY SINUS DISTAL BALLOON OCCLUSION FOR LEFT VENTRICULAR LEAD PLACEMENT IN A TORTUOUS TARGET VESSEL

P. PATEL, J. Banchs, R. Stevenson, N. Patel, G. Naccarelli, D. Wolbrette, S. Samii, E. Penny-Peterson, M. Gonzalez

Penn State Hershey Medical Center, Heart And Vascular Institute, Division of Cardiology, Hershey, USA

Cardiac resynchronization therapy (CRT) have shown to improves quality of life and prolong survival in patients with advanced heart failure. Successful lead placement occurs in 90-95%, with 70% in a first choice branch.
Failures are attributed to anatomical variants, phrenic nerve stimulation, high left ventricular (LV) threshold, lead instability or a tortuous vessel. We report a case where support to advance the lead into a tortuous vein was obtained by balloon occlusion of the coronary sinus (CS) distal to the target vessel leading to a successful lead placement.
An 81 year old female candidate for CRT presented for biventricular pacemaker implantation. After placement of the right ventricular lead, the CS was cannulated and an occlusive venogram was performed. A lateral branch was selected as the target vessel. Initial attempts at cannulating the vessel were unsuccessful due to the guidewire and telescoping delivery system prolapsing into the great cardiac vein. The acute angle prevented instrumentation of the branch with the tools available.
A second parallel CS sheath was advanced to drive a balloon catheter used to occlude the great cardiac vein distal to the target vessel. This provided support for the guidewire and lead allowing their advancement through the tortuous vessel. Consecutive traction on the balloon during also helped to reflect the lead towards the vessel. The lead remained stable in its final position on the lateral wall of the LV with appropriate thresholds and no diaphragmatic stimulation.
We report a case where balloon occlusion of the great cardiac vein distal to the target branch aided in advancing the LV lead into the desired position. This approach can be used in navigating lead placement to branches thought to be unreachable. Techniques such as this can decrease the failure rate of CRT implants.

TRIPLE VENTRICULAR CARDIAC RESYNCHRONIZATION (CR3V) IN VERY DILATED CARDIOMYOPATHY. PRELIMINARY STUDY ON FEASIBILITY

P. MONDOLY[1], A. Duparc[1], A. Hebrard[1], P. Rumeau[1], V. Bonnet[2], V. Chabbert[2], P. Massabuau[1], H. Coulier[1], P. Maury[1], M. Delay[1]

[1]CHU Rangueil - Fédération des services de cardiologie, Toulouse, FRANCE, [2]CHU Rangueil - Service de radiologie, Toulouse, FRANCE

Nonresponse is a restrictive factor in cardiac resynchronisation therapy. It was proved that a major left ventricle (LV) dilatation is one of the main factor for non response with persistence of a residual dyssynchrony (RD). The implantation of a third LV lead may prevent this RD.
8 patients (sex ratio 6/2) indicated to CRT, average-aged of 66.1 years old (of 52 years old in 78), average LV telediastolic diameter of 81.5mm and an average ejection fraction of 14.6% undergo CR3V implantation. Cardiomyopathy is idiopathic (5pts) or ischemic (3pts); 7 patients are in NYHA class III and one in class IV. All patients are in sinus rhythm, the average QRS width is 156 ms with 5 complete left bundle branch blocks, 2 incomplete left bundle branch blocks and one patient with permanent ventricular pacing. All of them have an echocardiographic intraventricular dyssynchrony.
The implantation of 4 leads (RA, RV, CS1, CS2) is possible in 7 out of 8 patients with one case of «acute instability» of the 2 CS leads. Overall, 6 patients have a CR3V device with an «Y» connector for the 2 coronary sinus leads. The average duration procedure is 186 minutes with an average time of fluoroscopy of 44.5 minutes.
Three months follow-up shows an improvement in NYHA class for each patient. The average increase of LVEF is 9.8%. There are 3 complications : 1 atrial lead's dislogement, 1 delay of healing and 1 asymptomatic hemopericardium.
CR3V is possible on patients with cardiomyopathy and major LV dilatation. The indication, the choice of the target vein and the evaluation of results should benefit from new cardiac imagery technology.

MAKING CRT IN HEART FAILURE PATIENTS BY CONVENTIONAL DUAL-CHAMBER PACEMAKERS. DO WE REALLY NEED RV ELECTRODE IN ALL CASES?

D. VOLKOV, V. Boyko, I. Polivenok, U. Skibo, O. Vinogorod'ska, E. Iacenko

Institute Of General And Urgent Surgery Of Ams, Kharkiv, UKRAINE

Background: CRT became world-wide accepted method of HF treatment. Some questions are still unsolved, one is comparison of biventricular (BiV) and uni-left ventricular (ULV) pacing for CRT.
Purpose: To evaluate atrial synchronized isolated LV pacing in DDD mode in selected group of patients with standard indications for CRT.
Material and methods: Target of selection were patients with absence of AV and RBB block on ECG, pulmonary artery preejection interval (PAPI)<110ms and significant interventricular (aortic preejection interval (AoPI)>150ms) and intraventricular dissynchrony (septal-posterior wall motion delay (SPWMD)>130ms). Five patients in sinus rhythm with such criterias (EF - 25±7%, LVEDD-67±4mm, PQ-165±15ms, QRS-155±25ms, PAPI-97±12ms, AoPI-184±31ms, SPWMD-156±24 ms) were implanted by Vitatron C60DR and ELA Medical Rhapsody D devices in two steps: 1) endocardial implantation of atrial lead; 2) epicardial screwing-in of Biotronik ELC 54/S-UP lead in the postero-lateral, mid-basal region of LV by thoracothomy following implantation of PM in left subclavicular space. After operation we synchronized mechanical output of both ventricles by adjusting AV delay (105±10ms) under ultrasound control to achieve AoPI equal or slightly less than PAPI.
Results: No complications during hospital staying (6±2 days), significant improvement in clinical status and positive instrumental changes (increase in EF-10±4%, decrease of QRS duration-135±15ms, LVEDD-58±8mm and SPWMD-78±51ms).
Conclusion: We suggest we can avoid implantation of RV lead in selected group of patients. Patients with preserved AV and RBB conduction and significant interventricular dissynchrony can be implanted by ULV DDD devices with adjustment of AV delay to synchronize LV to RV output by equalizing PAPI and AoPI. Probably, state of AV and RBB conduction should be defined invasively during 1 step of procedure. On average, this procedure is twice and half cheaper than conventional 3-chambers one, so it might be crucial for some developing countries where CRT can not be wide available due to economical factors.

NO CONTACT (NC) LEFT VENTRICULAR ACTIVATION ANALYSIS DURING CRT IMPLANTATION

C. Pratola, P. Notarstefano, T. Toselli, P. SQUASI, D. Mele, R. Ferrari

Arcispedale Sant'Anna, Ferrara, ITALY

Purpose: Only two thirds of patients (pts) candidates to CRT result responders at follow-up. Recent data suggest that echocardiographic parameters of dissynchrony do not predict response to CRT. Previous studies showed that NC mapping system performed before or after CRT implant is useful to study LV electrical properties and that propagation pattern of LV activation can influence echo response. Aim of this study was to evaluate safety and feasibility of NC mapping during CRT implantation.
Materials and methods: In six consecutive pts, during CRT implant, we performed a double transeptal puncture, to advance into the left ventricle a NC Array (St. Jude Medical) and a mapping catheter. After anatomy reconstruction, mapping catheter was withdrawn and a long introducer was advanced in its place to record the invasive pressure. LV activation were recorded during sinus rhythm, pacing from right ventricular apex, from different LV epicardial locations and in BIV mode, with the correspondent invasive pressure. An offline analysis of each pacing modality was than performed measuring: transeptal, total LV activation time, pattern of activation, site of earliest and latest site of activation.
Results: LV U shaped propagation pattern was found in 3 pts. Pacing from LV lateral site was followed by earliest LV activation with a variable delay (15-80msec). A wide variation was observed in the measured parameters. No complications occurred during NC studies. Total time of procedures was prolonged by 20 minutes on average. The best responder at follow-up was a DCM patient with LBBB, U shaped pattern in SR, fast conduction at site of LV pacing.
Conclusion: NC mapping during CRT is safe and feasible. It provides additional informations on electrical activation in SR and various modality of pacing.
Further studies with greater number of pts are necessary to effectively correlate electrical activation to clinical response.

MULTISLICE CT IMAGING OF CARDIAC VENOUS SYSTEM PRIOR CRT: SINGLE CENTER EXPERIENCE

I. BERTOLOZZI[1], G. Tognini[2], T. Torri[2], A. Pucci[1]

[1] Cardiologia e Cardiostimolazione, Ospedale di Carrara, Carrara, ITALY,
[2] Radiologia Ospedale di Carrara, Carrara, ITALY

Background: Significant coronary artery stenoses need to be ruled out in heart failure patients candidates to CRT. Multislice computed tomography (MSCT) allows at present assessment of coronary arteries and also visualization of the cardiac venous system (CVS) . At the present data on the value of MSCT for planning biventricular pacing are lacking.
Methods: 12 patients (70±6 y, 9/12 males) with NYHA III heart failure, LBBB and severe left ventricular dysfunction (EF<0.35) without a clinical history of unstable coronary artery disease, scheduled to CRT underwent 64 slices CT evaluation before the procedure. The suitability for cannulation and left ventricular lead positioning of the target veins were evaluated preoperatively on the base of CT images. CRT implantations were then performed.
Results: 2 pts had previous CABG, 3 pts had history of previous MI. All patients were in sinus rhythm, QRS duration was 147±20 msec and preoperative EF was 31±6%. The CS, posterior interventricular and anterior interventricular veins were present in all subjects. A lateral vein (LV) was present in 72% and posterior vein in 61%, both LMV and PV were present in 5 pts. 70% of LV were considered suitable for cannulation on the basis of diameter (>3mm) and angle of detachment from CS body (<90°). Thebesian valve was present in 3 pts.
All veins preoperatively considered as possible target were successfully cannulated. Occlusive retrograde venography was never performed and the procedural time, particulary fluoroscopic exposure was significantly shorter if compared with previous CRT implantation performed in our center.
Conclusion: At present MSCT are not routinely indicated to asses venous anatomy prior CRT for limitations due to heart rate, arrhythmias, contrast administration and radiation dose. In our study preoperative MSCT avoided to perform coronary angiogram and was of benefit in performing CRT procedure.

ASSOCIATION OF RS2200733 AT 4Q25 WITH ATRIAL FLUTTER / FIBRILLATION DISEASES IN ITALIAN POPULATION

A. MONTENERO[1], C. Viviani Anselmi[2], V. Novelli[2], R. Roncarati[2], A. Malovini[2], R. Bellazzi[1], R. Bronzini[1], G. Marchese[1], G. Condorelli[1], A Puca[1]

[1]IRCCS MultiMedica, Sesto S. Giovanni, ITALY, [2]University of Pavia, Pavia, ITALY

Atrial fibrillation (AF) and atrial flutter (AFL) are common cardiac conduction disorders affecting many individuals. Recent studies on sporadic cases of AF/AFL revealed a significant association of the single nucleotide polymorphism (SNP), rs2200733T, on chromosome 4q25 with these diseases, suggesting the critical function of the T-risk allele in disease development.

The aim of our study was to determine the association of rs2200733 in Italian patients with AF (n=45) or AFL (n=33).

We genotyped the SNP rs2200733 using a Taqman Assay in all the patients with AF or AFL and in 348 Italian controls. The case-control analysis performed by gPlink revealed that AF/AFL were strongly associated with the rs2200733 SNP. The risk-allele T of rs2200733 has an allelic frequency of 0.27 in AF and AFL patients combined and 0.15 in the controls.

Our results indicate that there is a positive, significant association between the rs2200733 T allele and Italian AF and AFL patients ($p<0.0001$ and $p<0.00007$, respectively). This is in agreement with a previously reported association study conducted on an Icelandic population, where the minor allele rs2200733T was found associated with AF and AFL.

ASSOCIATION OF THE TAQIB1B1 GENOTYPE IN THE CHOLESTERYL ESTER TRANSFER PROTEIN (CETP) GENE WITH ATRIAL FIBRILLATION IN WOMEN WITH HYPERTRIGLYCERIDEMIA

A. GALATI[1], G. De Masi De Luca[1], F. Galati[2], S. Massari[2]

[1]Division of Cardiology - Card. G. Panico Hospital, Tricase, Lecce, ITALY, [2]Disteba - University of Salento, Lecce, ITALY

The atrial fibrillation (AF) is the most common arrhithmia in clinical practice and it is associated to an increased total and cardiovascular mortality. Evidences for a possible genetic control of the pathogenesis of the disease have been reported in the literature. The cholesteryl ester transfer protein (CETP) gene is a candidate gene, and the TaqIB polymorphism in the first intron of the gene might be related to the presence of the AF. To investigate further the association between AF and TaqIB polymorphism we performed a case-control study. This study included 109 patients with a history of AF that have been admitted to our cardiology ward. For every case patient, a matched control subject, without a history of AF, has been selected from the same ward. Genomic DNA was extracted from all the subjects and the TaqIB genotype was determined with PCR and restriction fragment analysis. When the TaqIB1B1, TaqIB1B2 or TaqIB2B2 genotype frequencies were scored in the patients and in the control group, as well, we observed that the AF group has a significantly higher TaqIB1B1 genotype frequency than the control group (22.9% vs 12.8% - $p<0.05$). In addition we analyzed men and women separately and we found that the association between the TaqIB1B1 genotype and AF results significant only in women ($p<0.01$). Moreover the amount of HDL-C, serum triglycerides, C-reactive protein and IL-6 is higher in B1B1 genotype compared to the B1B2 or B2B2 genotypes in women. The present study strongly suggests that CETP TaqIB polymorphism is significantly associated with the presence of AF in women, in the context of elevated level of HDL-C and serum triglycerides, and high values of inflammatory markers.

RIGHT VENTRICLE HISTOLOGICAL FINDINGS AND ELECTROANATOMICAL MAPPING IN PATIENS WITH BRUGADA SYNDROME INDUCIBLE AL THE EP STUDY

S. FICILI[1], C. Pandozi[1], M. Galeazzi[1], M. Russo[1], C. Lavalle[1], F. Mele[1], C. Bernardi[1], L. Santini[2], R. Mango[2], F. Amati[3], S. Gennai[3], G. Novelli[3], F. Romeo[2], M. Santini[1]

[1]Cardiovascular Department San Filippo Neri Hospital, Rome, ITALY, [2]Cardiovascular Department, Tor Vergata University, Rome, ITALY, [3]Dept. Biopathology and Diagnostic Imagining, Tor Vergata University, Rome, ITALY

Objective: Recent papers showed that endomyocardial biopsy detected structural alterations in subjectes with Brugada syndrome inducible at EP study.

Methods: We studied 14 consecutive probands (12 males) with clinical and instrumental diagnosis of Brugada Syndrome.. According to the most recently proposed diagnostic criteria, the clinical presence of BS was based on demonstration on the ECG of a type 1 or a type 2 pattern that was converted to type 1 after flecainide testb(2mg/kg). Al patients were submitted to SEF and endomyocardial biopsy, and genetic study.

The elctrophysiological study was performed with stimulation in the apex and outflow tract of the right ventricle at 3 drives (600-400 msec) and up to 3 extrastimuli at a minimal coupling interval of 200 msec. The stimulation protocol was interrupted if VF or sustained VT (>30 seconds) was induced.

Endomyocardial biopsies were performed in the septal-apical wall of right ventricle. Myocardial specimens were fixed in 10% buffered formalin.

The diagnosis of myocarditis was established in the presence of inflammatory infiltrates associated with necrosis of adjacent myocites, according to the Dalls criteria.

Electroanatomical mapping was performed using CARTO system.

Genetic study for SCN5A mutational screening was performed onto DNA obtained from peripheral blood sample of all 14 patients.

Results: The majiority of patients (13) were asyntomatic , while 1 patient had a syncope.

Programmed electrical stimulation induced VF in 12 patients, sustained VT in 1 patient and only NSVT in 1 patients.

In all case there was no evidence of inflammatory infiltrates at the histological examination.

The electroanatomical mapping showed normal potentials of the right ventricle in all the patients.

The genetic study revealed 3 mutation (mutation rate 21,4%); IVS2 -24C/T in two patient (B6 and B11) and R1512W in one patient (B15).

Conclusion:

1) No histological abnormalities were found in patiets with Brugada ECG pattern inducible at the EP study.
2) No normal area was found in the endocardial voltage Carto map.
3) Difference in patient population between our and previous studies may explain the discordant results found in our studies.

MISLEADING INTERPOLATED PREMATURE ATRIAL DEPOLARIZATIONS IN PATIENTS WITH PAROXYSMAL ATRIAL FIBRILLATION: THEIR MECHANISM AND ORIGINATION

E. MIKHAYLOV, D. Lebedev

Almazov Heart, Blood and Endocrinology Centre, Saint-Petersburg, RUSSIA

A spontaneous interpolated atrial premature contraction (PAC) is an infrequent and poorly studied phenomenon.
Purpose: To evaluate incidence rate of interpolated PACs in patients (pts) with paroxysmal atrial fibrillation (PAF), and to discover distinctive features of interpolated PACs in comparison with non-interpolated PACs.
Methods. 44 pts with PAF were observed with 12-leads Holter monitoring. Interpolated PACs were compared with non-interpolated PACs which had compensatory pauses and were positioned within 60 seconds around interpolated PACs. Criteria for comparison: PAC coupling interval, time of appearance, heart rate, 10 sinus cycles lengths before ectopic event, sinus P width and PQ duration before ectopic event, features of intraventricular conduction, ectopic P wave morphology with subtraction of pre-ectopic T wave, antiarrhythmic therapy.
Results: Interpolated PACs were revealed in 5 pts (11.4%). One pt had periods of interpolated atrial bigeminy, another had blocked interpolated PACs. We assessed 34 interpolated PACs and 92 PACs with compensatory pauses. All interpolated PACs were "P on T'. We found difference between interpolated and non-interpolated PACs in pre-ectopic sinus cycle lengths; "coupling interval of PAC/pre-ectopic sinus cycle" ratio was 0.377 ± 0.03 and 0.45 ± 0.08 respectively. We also found a significant PQ interval prolongation after interpolated PACs in the first post-ectopic sinus complex. All other criteria were non-significant. According to vectorial and morphological analysis of ectopic P-waves after subtraction of pre-ectopic T-wave, we localized their origination from left upper pulmonary vein (LUPV) (3 pts) and from right upper pulmonary vein (RUPV) (2 pts).
Conclusion: In our study 11.4% pts had interpolated "P on T" PACs, presumably from upper pulmonary veins. Pre-ectopic sinus cycle length can play the most important role in forming of atrio-sinus block leading to interpolated PAC. Interpolated atrial bigeminy can imitate paroxysmal atrial tachycardia. Blocked interpolated PACs can be missed on ECG in a case of inattentive ECG analysis.

THE SLEW-RATE: A PREDICTIVE PARAMETER TO EVALUATE THE INTERFACE LEAD/MYOCARDIUM

M. HERO

Medtronic France, Boulogne-Billancourt, FRANCE

We suggested being interested in the theoretical and practical aspect of the slew-rate measurement, to obtain an evaluation of the relation between this measure and the other measures done during implantation and follow-up such as the stimulation thresholds, the value of the EGM and the impedance. The variation of this parameter will inform us about the quality of the interface lead/myocardium.
Method: The study recruited 746 patients not selected a priori, implanted for AVblock (51%) or sinus dysfunction (47%). 847 leads were retained to form 3 homogeneous and comparable groups for their physical, electric characteristics and their site of implantation for atrial and ventricular chambers. They correspond to the optimal characteristics (Gr1), acceptable (Gr2) and not acceptable (Gr3) of sensing and pacing parameters usually admitted by the literature.
Results: For auricular chamber, we retained a priori, 56 leads (Gr1), 168 for (Gr2) and 15 for (Gr3); the factorial discriminate analysis (FDA) was realized from the variables of slew-rate, sensing per and post-op and threshold per and post-op gives us a result of 83.7% of individuals good classified.
For the ventricular chamber, we retained a priori, 183 leads (Gr1), 168 (Gr2) and 9 (Gr3); the FDA realized from the same variables gives us a result of 80 % of individuals good classified. The comparison of the averages between groups for every variable shows a significant difference between these groups as well as in the atrial and the ventricular chambers. The data of the others leads (atrium n=94 and ventricle n=154) were affected by the FDA calculation.
Discussion: The results shown a correlation between slew-rate and electric parameters per and post-op for the 3 groups for atrial and ventricular chambers; a new standard for sensing, pacing and slew-rate values were defined as optimal, acceptable and no-acceptable.

CAVO-TRICUSPID ISTHMUS: ONE OF THE MOST VULNERABLE ZONE IN ATRIAL TISSUE? LESSONS FROM BIGEMINY PACING PROTOCOL

P. FIORELLO, C. Bertrand, F. Halimi, J.F. Leclercq, P. Attuel

Centre medico-chirurgical de Parly 2, Le Chesnay, FRANCE

Background: Atrial flutter (AFL) is a frequent atrial arrhythmia. Recent studies underline its role in atrial fibrillation (AFib) pathogenesis. In patients (pts) having both AFL and AFib, classical vulnerability testing of the atria may induce AFib and mask AFL. We tried to induce AFL more specifically with a less aggressive protocol, i.e. bigeminy pacing, in order to evaluate its predictive value in pts with and without documented AFL.
Methods: We studied 45 pts of 63.7±17.8 yrs divided in two groups: Group 1 (n=20), with documented sustained AFL alone in 15 pts, and both AFL and AFib in 5. Group 2 (n=25) with pts referred for dizziness or syncope without documented atrial arrhythmia. We measured effective and functional refractory periods (ERP,FRP), then a bigeminy pacing was performed during 4 minutes. The S1-S1 interval used was 10% shorter than sinus cycle length, and the coupling interval S1-S2 was programmed to a mean value of 270±23 ms, i.e. 10% longer than the basic AERP.
Results: No difference was observed in terms of basic pacing rate during bigeminy pacing nor in the coupling interval S1-S2. Values of ERP and FRP were similar (244.0±34 vs 238.6±22 and 286.0±3 vs 304.9±17 ms respectively, pNS). During the 4-min bigeminy pacing, 18/20 pts of group 1 and 7/26 pts of the group 2 developed a common sustained right AFL. No sustained AFib was induced. Sensitivity, specificity, negative and positive predictive values were 90%, 78%, 90% and 78% respectively. Chi square test=20.04.
Conclusion: Common AFL is easily induced by bigeminy pacing in pts with AFL alone or associated with AFib. Hence, CVI can be considered as one of the most vulnerable zone within atrias. Further studies are needed to determine the value of this protocol for other organized atrial tachycardias before and after radiofrequency ablation.

SELECTION OF CANDIDATES FOR CARDIAC RESYNCHRONISATION THERAPY AND PREDICTION OF THEIR RESPONSE

S. AGOSTI, L. Casalino, G. Bertero, M. Brunelli, A. Barsotti, C. Brunelli

San Martino University, Dept Cardiology, Genoa, ITALY

Purpose: Cardiac resynchronization therapy (CRT) is currently used in selected patients with end-stage heart failure, refractory to medical therapy. However, 30% of patients do not respond to CRT when selection is based on standard clinical and electrocardiographic criteria.
The aim of our study was to find echocardiographic (TDI), electrocardiographic (QRS interval and electric distance between right and left catheter), clinical (6MW test) or autonomical (HRV) parameters able to predict responsiveness to CRT.
Methods: Fourty-seven patients (38 males, 9 females, mean age 74+/-10 years) with end-stage heart failure, symptomatic (NYHA 3.3+/-0.8), with left ventricular (LV) ejection fraction <35% (24.85+/-6.677%) and QRS > or =120ms (148.77+/-30.120), underwent CRT.
Results: At thirteen months follow up, all clinical and echocardiographic parameters significantly improves (EF p<0.001; LVED volume (ml) p<0.001; 6MWT p<0.001; max delay TDI p<0.001; HRV p<0.05; Right-left distance p<0.05).
A positive response was documented in 31/47 (67.4%) patients who presented an increase in LVEF > or = 5 units. There was a significant difference of LVED diameter (R 64.9+/-5.810 vs NR 69.79+/-8.331¸ p<0.05) and HRV (R 55.00+/-15.334 vs NR 84.50+/-12.021, p<0.05) between responders and non responders.
Receiver-operating curve analysis showed that a positive response to CRT may be predicted in patients with LVED diameter <67mm (with a sensitivity of 77% and a specificity of 88%).
Conclusions: our results confirm the clinical improvement obtained by CRT in end-stage heart failure patients as well as the limited value of QRS duration and intraventricular dyssynchrony as predictor of clinical recovery after CRT.
While a most-advanced clinical stage of disease (HRV) without an advance left ventricular remodeling (LVED diameter) demonstrated to predict response to CRT, with a sensitivity of 77% and a specificity of 88%.

QRS COMPLEX DURATION PREDICTS CLINICAL OUTCOME IN CARDIAC RESYNCHRONIZATION THERAPY

F. CABRERA-BUENO, J. Fernandez-Pastor, J. Peña-Hernandez, J. Alzueta-Rodriguez, J.M. Garcia-Pinilla, A. Barrera-Cordero, A. Linde-Estrella, E. De Teresa-Galvan

Hospital Universitario Virgen De La Victoria, Malaga, SPAIN

Background: Cardiac Resynchronization Therapy outcomes are significative different among patients. The aim of this study was to know the impact of QRS complex duration on CRT results.
Methods: A total of 76 patients with heart failure scheduled for implantation of CRT device were included. We studied the possible relationship between basal and paced QRS complex duration and the occurrence of cardiac adverse events during follow-up (death, transplantation and admission because of heart failure).
Results: We included 76 patients, 22 (28.9%) female (63±11 years). Basal QRS wide was 169±26ms and 92.1% of patients showed echocardiographic dyssynchrony. Paced QRS wide after device implantation was 128±27 ms (mean reduction 21±17%), showing reverse remodeling (end-systolic volume reduction >10%) in 61% of patients. After follow-up of 14±3 months, we documented cardiac adverse events in 19 patients (7 deaths and 12 heart failure admissions). Patients showing a worse clinical evolution had larger LV end-diastolic (220±80 vs 160±76 mL;P<0.01) and LV end-systolic volumes (166±72 vs 104±67 mL; P<0.05), presence of moderate-severe mitral regurgitation (ERO>0.20 cm2), but similar ejection fraction, baseline QRS wide and echocardiographic dyssynchrony. There were no differences between groups in ventricular dysfunction etiology, baseline rhythm or treatment. However, paced QRS complex duration in these patients were higher (136±13 vs 125±17 ms, P=0.015), and this factor was an independent predictor of a worse clinical evolution (OR 1.08 for CI 95% 1.02-1.15).
Conclusions: Paced QRS complex duration is predictive for clinical responses to CRT at long-term follow-up. Left ventricular pacing site must be selected to obtain the shortest QRS during biventricular stimulation.

EJECTION FRACTION (EF) SHOWED TO BE THE ONLY PREDICTOR OF FAVORABLE RESPONSE TO CARDIAC RESYNCHRONISATION THERAPY (CRT) IN A GROUP OF IMPLANTED PATIENTS

L. BARBONAGLIA, M. Falcone, S. Mazza, S. Macciò, G. Rognoni

Ospedale S. Andrea, Vercelll, ITALY

Aim: To find, among baseline clinical variables, possible predictors of a favourable response to cardiac resynchronisation therapy (CRT).
Methods: Seventy-four consecutive patients were admitted in our Institution and implanted with CRT, according to indications. The considered variables were: age (69±10), ethiology (ischemic: 48%; primitive dilated cardiomiopathy =42%), ejection fraction (EF:28±6), NYHA class (>II=74%), BNP (median:272) or NT-proBNP (median:1930), presence of electrical dyssynchrony (83%), mechanical dyssynchrony (76%) and both of them (70%), difference between basal and paced QRS (£GQRS= -23±21 ms), interval from the beginning of QRS and the beginning of signal measured by LV lead (QRS-VS= 73±42), and LV pacing lead position (lateral or posterolateral vein: 88%). The contemporary presence of EF increase above 5% and a reduction in one point of NYHA class (III and IV class) identified responder patients (66%).
Univariate and multivariate analysis were done to evaluate the presence of correlation between clinical and instrumental variables and response to CRT.
Results: At univariate analysis the following parameters were associated to a positive response to CRT: EF (27% vs 31%), electrical dyssynchrony (64% vs 78%), mechanical dyssynchrony (68% vs 50%), lateral or posterior vein (67% vs 50%), but only EF reached statistical significance (p=0.01). No relevant differences were found for all other variables.
No significant difference was shown at the multivariate analysis.
Conclusions: Our data underline how EF, simple and effortless parameter, seems to highly detect patients responder to CRT. The lack of statistical significance for some variables can be due to the restricted number of patients and deserves additional investigation.

USE OF CARDIOPULMONARY EXERCISE TESTING TO PREDICTE THE EFFICACY OF CARDIAC RESYNCHRONIZATION THERAPY

E. FILIPPINI, E. Barbaresi, S. Stabellini, L. Bacchi Reggiani, S. Specchia, G. Boriani, A. Branzi

Institute of Cardiology, University of Bologna, Bologna, ITALY

Purpose: Cardiac Resynchronization teraphy (CRT) is not useful in a share of patients with heart failure (HF). We tried to search some functional variables related to the efficacy of CRT in a group of patients underwent maximal cardiopulmonary exercise testing (CPET).
Methods: 60 patients, (44 male and 16 female) affected by dilated cardiomiopathy (44 idiopathic and 16 ischemic), in NYHA II-III, underwent CPET on an ergometer cycle (10 w/min), before and 3-5 months after implant of biventricular pacemaker (pre-BIV and post-BIV).
Group A: patients that increased peak of oxygen uptake (p-VO2) post-BIV.
Group B: patients that not increased peak-VO2 post-BIV.
Both the two groups had not statistically different mean value of FE (25%±5) and left ventricular size (td: 7,1±0,8 cm; ts: 6,0±0,9 cm).
Results:
-Age of implant of BIV: 58,5±13,0 years in group A; 67,2±9,0 years in group B ($p<0.01$).
-peak-VO2: 15,2±4,3ml/kg/min in group A; 18,0 ± 5,2 ml/kg/min in group B ($p<0.02$).
-peak SBP: 133±22 mmHg in group A; 145±19 mmHg in group B ($p<0.03$).
Conclusions: By these results the efficacy of CRT in patients with HF seems to be related to a lower age of implant of the device and to a lower peak of VO2 and of SBP at pre-BIV CPET, probably due to a higher capacity of recovery in young patients with a worse cardiopulmonary capacity.

WHICH CLINICAL CHARACTERISTICS AND CO-MORBIDITIES INFLUENCE ALL CAUSE MORTALITY IN PATIENTS IMPLANTED WITH CRT? DATA FROM THE ACTION-HF REGISTRY

G. BOTTO[1], M. Mantica[2], C. La Rosa[3], G. Molon[4], A. Scaccia[5], R. Sangiuolo[6], D. Pecora[7], G.P. Gelmini[8], F. Telara[9], G.Q. Villani[10]

[1]Ospedale S. Anna, Como, ITALY, [2]Clinica S Ambrogio, Milano, ITALY, [3]Osp. Villa Verde, Taranto, ITALY, [4]Osp. S.Cuore, Negrar, ITALY, [5]P.O. di Frosinone, Frosinone, ITALY, [6]Osp Fatebenefratelli, Napoli, ITALY, [7]Fondazione Poliambulanza, Brescia, ITALY, [8]A.O. Desenzano del Garda, Desenzano del Garda, ITALY, [9]Boston Scientific, Segrate, ITALY, [10] Ospedale Civile G. da Saliceto, Piacenza, ITALY

Introduction: Although CRT have demonstrated efficacy in reduction of all-cause mortality, it is not yet clear, in the current clinical practice and outside the realm of randomized clinical trials, which clinical characteristic or patient co-morbidity may influence all cause-mortality.
Methods: Aim of the analysis is to see, in patients indicated for CRT with defibrillator backup for primary prevention enrolled in the ACTION-HF registry, which clinical characteristics or co-morbidities predicts one year all cause mortality.
Results: Data from 371 patients and followed for one year were considered (male gender: 81%; ischemic aetiology 47%; age 68±9; QRS duration 156±31; ejection fraction: 266; NYHA class>II 71%). Risk factors and co-morbidities analyzed were: hypertension 47%; hypercholesterolaemia 36%; overweight 31%; diabetes 25%; chronic obstructive pulmonary disease (COPD) 24%; renal disease 23%. Twenty-six patients died before the first year of follow up. At multivariate analysis diabetes (OR: 2.9 $p<0.05$), COPD (OR: 3.8 $p<0.01$) and ejection fraction <=25% (OR: 3.2 $p<0.05$) were significant predictors for all cause mortality at one year.
Conclusion: Patient implanted with CRT can be affected by several co-morbidities. In this data set of patients implanted with CRT, those affected by diabetes, COPD and with very depressed ejection fraction were exposed to higher risk for mortality at mid-term follow up. Data on longer follow up are expected to confirm these results.

PROGNOSIS IN CARDIAC RESYNCHRONIZATION THERAPY: LONG-TERM FOLLOW-UP AND PREDICTORS OF CLINICAL OUTCOME

R. VAN BOMMEL, C. Borleffs, C. Ypenburg, G. Bleeker, E. van der Wall, M. Schalij, J. Bax

Leiden University Medical Center, Leiden, THE NETHERLANDS

Purpose: Cardiac resynchronization therapy (CRT) is a well established treatment for patients with drug-refractory heart failure. Large clinical trials have shown a survival benefit for patients treated with CRT as compared to optimized medical therapy. These studies however, used selected patients and have relatively short follow-up. To investigate long-term outcome we conducted a registry study in a large cohort of heart failure patients treated with CRT at our center.
Methods: We included total of 477 consecutive patients undergoing CRT at our center. To facilitate comparison with larger clinical trials, clinical end-points were chosen similarly to those used in the CARE-HF trial (time to all-cause mortality and time to all-cause mortality or major cardiovascular event). Also, we investigated characteristics that may be of influence on prognosis in uni- and multivariate analyses.
Results: Complete clinical follow-up was achieved in 474 patients (99%). Mean follow-up was 33±85 months. Within this period 127 patients (27%) died. One and two year mortality rates were similar to those reported in CARE-HF, 8.6% and 17% in the current study vs 9.7% and 18% in CARE-HF. Multivariate analysis demonstrated diabetes, reduced renal function, increased LVESV and reduced distance covered in the 6 minute walk test to be associated with worse long-term outcome after CRT.
Conclusion: This study aimed to verify long-term clinical results after CRT as reported by large clinical trials. Results at our center are comparable to those published by the CARE-HF trial. Several characteristics proved to be predictive of lower survival probability after CRT.

THE SEPTAL RV STIMULATION REDUCES THE TIME OF VENTRICULAR ACTIVATION AND AVOIDS THE ASYNCRONOUS CONTRACTION

G. MAZZOCCA, E. Venturini, L. Magni

Cardiovascular Unit General Hospital, Cecina, Livorno ITALY

The right ventricular apex (RVA) stimulation cause delay and asynchronous contraction of LV, leading congestive heart failure and reduced survival.

Purpose: Was to evaluate if RV septal (S) pacing can avoid activation delay and asynchrony.

Methods: We enrolled 86 consecutive pts (age 75±10 years, 66 males 20 females) for RVS stimulation (15 VVIR, 71 DDD / DDDR) excluding patients with LBBB and EF<35% suitable for CRT. We used bipolar standard screw-in leads (Medtronic 5076) which were anchored in the RVS.The ventricular lead before being anchored in RVS was placed at RVA, in both positions was recorded a standard 12 leads EKG, to assess the duration of QRS stimulated in the two different positions. In a group of 20 patients was carried out an ecocolordoppler evaluation before implant and after every six months, to assess the indexes of ventricular function, inter and intraventricular asynchrony.

Results: The average length of follow-up was 33±11 months. The stimulation' threshold was evaluated in acute (0.50±0.18) at 1 month and 1 year follow-up (0.55±0.20), p=ns. The average duration of QRS in patients with RVS stimulation was 119±18ms and in the same patients the average duration of QRS during RVA stimulation was 179±20ms (p<0.0001). In the group of 20 patients monitored with ecocolordoppler for over 2 years was not highlighted the emergence of left ventricular asynchrony and 4 patients in whom this was present before the implant was no longer present after. No patient had complications related to procedure and the average fluoroscopy time for RVS positioning was 3.26 minutes.

Conclusion: The RVS stimulation is feasible and safe, reduces the time of ventricular activation, it is promising preserving ventricular synchrony, and can be carried out with standard leads.

ACUTE EFFECTS OF RIGHT VENTRICULAR APEX, HIS, PARA-HIS AND OUTFLOW TRACT PACING ON LV DYSSYNCHRONY

G. PASTORE, F. Zanon, E. Baracca, S. Aggio, M. Carraro, C. Piergentili, G. Braggion, L. Roncon

General Hospital, Rovigo, ITALY

Introduction: Aim of study was to compare degree and intrapatient relative changes in ventricular dyssynchrony induced by pacing from different RV sites: apex (RVA), direct His Bundle (DHB), para-His Bundle (PHB) and RV outflow tract (RVOT) divided in RVOT septum (RVOTs) and free wall (RVOTf) in according to fluoroscopic view and QRS morfology.

Methods: 221 pts (126 males, 73±14y) underwent permanent ventricular pacing at the following different RV sites: RVA 116, DHB 28, PHB 23, RVOTf 26 and RVOTs 28. All pts were similar in terms of structural characteristics: LVEF(61±6%), LVEDV(63±7ml/m2), no valvular desease. An echocardiogram and TDI were performed before (baseline) and 1.5±0.8 days after PM implant to evaluate:1) time interval between the earliest-latest basal LV motion (ILV);2) electromechanical latency (EML) defined as the time interval between the QRS onset and LV electromechanical activation of basal segments;3) intrapatient relative changes on ILV [deltaILV%= (ILVpacing-ILVbaseline/ILVbaseline)] and EML [deltaEML%=(EMLpacing-EMLbaseline/EMLbaseline).

Results: Intrapatient values of ILV (baseline vs after pacing) and deltaILV% from RVA: 31±18 vs 41±22ms (p<0.05), deltaILV=33%; from DHB: 27±11 vs 25±11ms (p=NS), deltaILV=-8.4%; from PHB: 29±17 vs 34±13ms (p=0.03), deltaILV=18.3%; from RVOTs: 32±18 vs 29±13ms (p=NS), deltaILV=-9.6%; from RVOTf: 35±25 vs 48±31ms (p<0.05), deltaILV=35.7%.

Intrapatient values of EML (baseline vs after pacing) and deltaEML% from RVA: 162±35 vs 210±40 (p<0.05), deltaELM=29.1%; from DHB: 169±23 vs 180±21ms (p=NS), deltaEML=6.2%; from PHB: 180±19 vs 215±20ms (p<0.05), deltaPHB=19.9%; from RVOTs: 184±34 vs 191±31ms (p=NS), deltaEML=7.8%; from RVOTf: 179±23 vs 225±3 ms (p<0.05), deltaEML=25.6%.

Conclusion: RVA and RVOTf pacing induced a more degree and relative changes in dyssynchrony. DHB and RVOTs maintain the baseline activation. PHB pacing significantly increased LV dyssynchony indexes, however less than RVA and RVOTf pacing.

INTRATHORACIC IMPEDANCE MONITORING IN PATIENTS WITH IMPLANTABLE CARDIOVERTER DEFIBRILLATOR DEVICES AND DETECTION OF HEART FAILURE DECOMPENSATION

J. GONZALEZ MIRELIS[2], I. Fernandez Lozano[1], J. Toquero Ramos[1], V. Castro Urda[1], V. Mariona Montero[1], L. Nombela Franco[2], L. Pulpon Rivera[2]

[1]Hospital Universitario Puerta De Hierro/Department Of Arrhythmia, Madrid, SPAIN, [2]Hospital Universitario Puerta De Hierro/Department Of Cardiology, Madrid, SPAIN

Patients with advanced heart failure (CHF) have an elevated hospital admissions rate because of decompensation of their basal status. Optivol is a fluid status monitoring system that measure changes in intrathoracic impedance.

Between October 2004 and May 2008, we implanted 65 cardioverter defibrillator devices (ICD) with Optivol (35% of devices with CRT). Follow-up evaluations were every 6 months or, in the first 24 hours after an Optivol alert.

Results: Mean age was 58.8 years, 84% male. The main diagnosis by frequency were: nonischemic dilated cardiomyopathy (DCM 37%), coronary artery disease (CAD 32%), rheumatic heart disease (10%) and hypertrophic cardiomyopathy (10%). The 53% of patients were in NYHA class III. Basal mean echocardiographic parameters were: EDLVD 59±11 mm, ESLVD 48±14 mm, EF 33±16%.

After 36 months, there were 50 Optivol alerts (33 patients), classified in: 1) true positive 20 patients (40%), correlation between alert and patient's symptoms or a clear cause of CHF decompensation; 2) probably positive 7 (14%), with a cause of CHF decompensation and/or elevated NT-proBNP levels but asymptomatic; 3) false positive 23 (46%), with no cause and asymptomatic; and 4) false negative 3 (6%), who were hospitalized because of CHF decompensation with any alert detected.

The causes of CHF decompensation were: worsening of systolic function 54%, lowering in diuretic dose 15%, atrial fibrillation 15%, fluid intake overload 12%, disfunction of CRT device (loss of capture of LV electrode) 2%. There were 8 hospital admissions because of decompensated CHF in 5 patients (including the 3 false negative cases).

Conclusion: Optivol system effectiveness in the early detection of CHF decompensation episodes in our population was 40%. There is a lower sensibility than the observed in previous trials, probably in

relation to the current implantation of devices with Optivol to patients with higher NYHA class and with no indication for CRT.

THE TRANS-VALVULAR IMPEDANCE WAVEFORM CAN REFLECT VENTRICULAR DESYNCHRONIZATION

G. NERI[1], D. Vaccari[1], G. Masaro[1], M. Crosato[1], A. Barbetta[2], F. Di Gregorio[2]

[1]Cardiology Department, Montebelluna,Treviso, ITALY, [2]Clinical Research Department Medico Spa, Rubano, Padova, ITALY

Ventricular desynchronization is drawing increasing attention as a cause of reduced contraction efficiency and increased myocardial stress. In the long run, such condition may represent a risk factor for the development of heart failure and atrial fibrillation. Since right ventricular pacing (RVP) can entail desynchronization, prompt detection of changes in contraction mechanics is an important concern in the follow-up of pacemaker (PM) recipients. We studied 16 patients affected by SSS with or without AVB, with normal pump function on PM implantation (EF=63%±6). Ventricular leads were positioned in right apex. As demonstrated by echo-Doppler, the delay between the onset of pulmonary and aortic flow never exceeded 40ms with intrinsic AV conduction (AVC), while it was >40ms in 3 cases during RVP, indicating a condition of iatrogenic LBBB. All patients were implanted with the PM Sophòs 151 (Medico, Padova, Italy), a device equipped with the trans-valvular impedance (TVI) sensor. TVI is the electric impedance between righ atrium and ventricle: it increases in systole, reaching the maximum peak at the T-wave end, and decreases in diastole. The TVI waveform was similar with either AVC or RVP in patients who did not show pacing-induced desynchronization at the echocardiographic evaluation, while it was substantially affected by RVP in case of desynchronization. In this instance, the signal showed a fast rate-of-rise and more than one peak in the QT period, or a decrease in peak-peak amplitude below 70% of the AVC value. Based on such criteria, desynchronization was identified by TVI changes with 100% sensitivity, 92% specificity, 75% and 100% positive and negative predictive value, respectively. Our results suggest that TVI could be a surrogate of complex echocardiographic assessment available since the implantation to evaluate the haemodynamic impact of RVP and the possible need for an alternative stimulation site.

QUANTITATIVE ASSESSMENT OF RATE-DEPENDENT HEMODYNAMIC MODIFICATIONS WITH THE TRANS-VALVULAR IMPEDANCE SENSOR

E. Moro[1], G. ALLOCCA[1], E. Lanari[1], S. Cukon[1], E. Marras[1], N. Sitta[1], C. Marcon[1], F. Di Gregorio[2], A. Barbetta[2], P. Delise[1]

[1]Department of Cardiology - General Hospital, Conegliano, Treviso, ITALY, [2]Clinical Research Unit - Medico Spa, Rubano (PD), ITALY

Introduction: Trans-valvular impedance (TVI) shows an inverse relationship with ventricular volume during the cardiac cycle, increasing in systole and decreasing in diastole. The TVI waveform is modulated by stroke volume and preload and can therefore reveal qualitative changes in the hemodynamic function. However quantitative data on the matter are not yet available.

Aim: To investigate if a quantitative correlation exists between echocardiographic indices of left-ventricular performance and TVI measurements.

Methods: We studied 8 patients implanted with dual-chamber pacemakers equipped with the TVI sensor (Sophòs, Medico). In each patient, acute changes in diastolic filling were induced by temporarily increasing the pacing rate stepwise from 60 to 110 bpm. The associated hemodynamic effects were assessed by Doppler measurement of mitral and aortic flow velocity, and by determination of left-ventricular end-diastolic and end-systolic volume (EDV-ESV) by echocardiography. The TVI signal was simultaneously recorded and displayed by pacemaker telemetry.

Results: In DDD pacing at rate exceeding 80 bpm, left-ventricular diastolic filling time decreased with average slope of 22±12ms/100ms reduction in cycle length. A corresponding rate-dependent reduction in stroke volume was identified by evaluating both left-ventricular EDV-ESV and aortic Doppler velocity-time integral (VTI): –23%±13 and –15%±10, respectively, with rate increase from 60 to 100 bpm. In such conditions, the peak-peak amplitude of TVI fluctuation was reduced as well (–15%±13). Relative changes in peak-peak TVI amplitude and aortic VTI as a function of pacing rate were positively correlated in 75% of the cases, with R^2=0.76±0.24. Relative changes in end-diastolic TVI and EDV were negatively correlated, with R^2=0.83±0.12.

Conclusions: This study suggests that TVI can reflect quantitative modifications in left-ventricular function, even if the signal is derived in the right heart. Our findings confirm that TVI recording could provide valuable information in permanent hemodynamic monitoring and autoregulation of pacemaker setting.

THE COST OF ICD THERAPY IS DEPENDENT ON DEVICE LONGEVITY

M. BIFFI, M. Ziacchi, M. Bertini, D. Saporito, C. Valzania, G. Domenichini, C. Moschini, E. Cervi, C. Martignani, I. Diemberger, G. Boriani

Institute of Cardiology - S. Orsola-Malpighi Hospital - University of Bologna, Bologna, ITALY

Background: ICD therapy is cost-effective, as based on available literature. Beyond device technical specificities, a superior longevity is the main determinant to improve cost-effectiveness. We evaluated the cost of ICDs from different manufacturers based on their actual longevity as measured at device replacement.

Methods: Longevity of single chamber (SC), double chamber (DC), and biventricular (BiV) ICDs from Medtronic (MDT), Guidant (GDT) and St. Jude Medical (SJM) was measured in all the patients implanted in years 2000, 2001, 2002 who reached device replacement within December 31st 2007. The cost of each ICD (device + lead/s) was averaged for its own longevity.

Results: 107 ICDs were replaced in the abovementioned period. ICD longevity (in terms of months) was significantly greater in MDT with respect to GDT and SJM in SC (p=0.028), DC (p=0.001) and even in CRT-D ICDs at Kruskal-Wallis test. At the same way ICD cost/month (in terms of euros) was significantly lower in SC (p=0.001) and DC (p=0.001) MDT ICDs with respect to the other two manufactures at Kruskal-Wallis test.

Conclusions: Cost effectiveness of ICD treatment is strictly dependent on device longevity, whereas device upfront cost is of limited clinical meaning. Appropriate assessment of cost-effectiveness should be based on ICD longevity in the real-life scenario.

ARRHYTHMIA IN PEDIATRIC IDIOPATHIC DILATED CARDIOMYOPATHY

K. WENG[1,2], C. Lin[1], K. Hsieh[1]

[1]Kaohsiung Veterans General Hospital, Kaohsiung, TAIWAN, [2]Zuoying Armed Forces Hospital, Kaohsiung, TAIWAN

Background: The prognosis of patients with idiopathic dilated cardiomyopathy (DCM) is poor. Most patients died while waiting for cardiac transplantation because of few donors. The purpose of this study is to evaluate the relation of arrhythmia with idiopathic DCM in our pediatric patients.
Methods: Thirty-six patients with idiopathic DCM presenting were included. They were classified into two groups according to outcome. Group 1 consisted of 26 patients who died. Group 2 consisted of 10 patients who survived. The clinical findings, echocardiography, and EKG or Holter data were compared between two groups.
Results: The age at initial diagnosis for the 36 patients (22 males, 14 females) ranged from fetus to 13 years (median 3 months). The follow-up period ranged from 12 days to 44 months (median 7 months) in group 1 and from 1 month to 48 months (median 39 months) in group 2. Of 36 patients, 26 (72%) died: 22 died of severe heart failure while waiting for cardiac transplantation. The cumulative survival rate was 50% at 1 year, and 28% at 4 years. In group 1, an arrhythmia was found during illness in 20 patients as follows: atrial fluter/ atrial fibrillation (n=4), supraventricular tachycardia (n=4), frequent premature atrial complexes (n=2), nonsustained ventricular tachycardia (< 30 seconds in duration) (n=2), ventricular couplet (n=4), frequent premature ventricular complexes (n=4). In group 2, an arrhythmia was found during illness in 2 patients as follows: frequent premature atrial complexes (n=1), frequent premature ventricular complexes (n=1). The presence of arrhythmia and low left ventricular ejection fraction were predictive of a poor outcome.
Conclusions: Arrhythmia may be a marker for the risk of mortality in idiopathic DCM. Advocating organ donation to increase the size of the organ donor pool is needed to significantly reduce the rate of mortality while waiting.

TREATMENT STRATEGY OF ATRIAL INCISIONAL TACHYCARDIAS IN CHILDREN

O. Murzina, I. Kovalev, L. SVINTSOVA, R. Tatarski, S. Popov

Institute Of Cardiology, Tomsk, RUSSIA

Aim: The aim was to assess treatment efficacy of incisional atrial tachycardias in children.
Material and methods: Treatment results of postoperative atrial tachyarrhythmias in 37 patients aged from 1 month to 14 years were analyzed. Structure of congenital valvular diseases (CVD): septal defects (n=14); radical correction of complex CVD (tetralogy of Fallot, TMV, prostheses of valves) (n=23).Atrial tachyarrhythmias were revealed 3-5 years after the surgery in 12 patients, 25 patients revealed their tachycardias early (to 2 weeks) after the surgery.
Results: Selection of antiarrhythmic therapy was performed on the first stage of the treatment in 21 patients having permanently-recurrent tachycardias. Monotherapy with cordaron was most effective. Four patients having permanent atrial flutter early after the surgery underwent electroimpulse therapy (EIT) with positive effect in three of them. Twelve patients aged from 3 to 14 years underwent radiofrequency ablation (RFA). Electrophysiologic study results revealed isthmus-dependent atrial flutter in 7 (58%) of patients. Circulation of the excitation front occurred around the scars in 5 children. Follow-up period was 3 years. RFA efficacy was 100%.
Conclusion: Drug therapy and EIT of postoperative atrial tachycardias is effective enough. In ineffective drug therapy, RFA of tachycardia is method of choice irrespective of the patient's age.

EXERCISE TREADMILL TEST IN CHILDREN WITH VENTRICULAR ARRHYTHMIAS

B. PIETRUCHA[1], A. Sulik[2], J. Oko-Lagan[1], T. Czyzowska[2], A. Rudzinski[1]

[1]Children Cardiology Department, Children University Hospital of Jagiellonian University in Krakow, Krakow, POLAND, [2]Electrocardiology Laboratorium of Children Cardiology Department, Children University Hospital of Jagiellonian Universit, Krakow, POLAND

Aim: The aim of our study was assessment of changes in ECG trace during treadmill exercise test in patients with ventricular arrhythmias.
Study group consists of 30 pts aged 7.1 to 17.8 years (mean 14.2 years): 19 boys and 11 girls with ventricular ectopics diagnosed in Children Cardiology Department – Group I and 27 patient without heart disease age and sex matched to the study group – Group II.
Group I was formed with 28 children with normal heart anatomy, 2 pts after Senning operation of transposition of great arteries. 2 pts suffered from diabetes mellitus.
Treadmill exercise test with Bruce protocol was performed in all patients with assessment of maximal heart rate - %HR ; achieved metabolic equivalent of exercise – MET; presence of ventricular ectopics, ventricle tachycardia during test.
Results: There was no difference between maximal heart rate in both groups (%HR – 103,8 vs 104,5) and achieved metabolic equivalent of exercise – MET (respectively 13.7 vs 13.28±1,76). Positive test result was noticed in 2 pts (13.3%) from Group I (in 1 pts right bundle branch block and non-sustained ventricle tachycardia were present during recovery time and in 1 pt with diabetes also non-sustained ventricle tachycardia was present).
Conclusions: In majority of children with ventricle contractions diminishing of ectopics was observed during exercise treadmill testing.
Children with ventricular arrhythmia have comparable exercise capacity with healthy subjects.

AGE DEPENDENT CLINICAL CHARACTERISTICS IN CHILDREN WITH SUPRAVENTRICULAR TACHYCARDIA

S. TADIC[1], M. Grujic[2], R. Papic[3], J. Marinkovic[4]

[1]Clinical Center; Zemun, Belgrade, SERBIA, [2]Institute For Cardiovascular Disease, Belgrade, SERBIA, [3]Mothers and Child Institute, Belgrade, SERBIA, [4]School Of Medicin Univrsity Of Belgrade, Belgrade, SERBIA

Aim: to investigate age dependent clinical characteristics of paroxismal supraventricular tachycardia (PSVT) in children and adolescents.
Method: We investigated 231 children and adolescents with first attack of PSVT at 1st day until 19 years, M:F=132:99, 145 with WPW syndrome. All of them had ECG during PSVT and in sinus rhythm and echocardiography, 70 24 h Holter monitoring and 73 intracardiac electrophysiologic investigation. They were devided in four age dependent groups and followed-up from 2 to 18 years (mean 5.4+-3,2 years).
Results: During first year of life, PSVT appeared in first 4 months in 42 of 54 (88%), equal with and without WPW syndrome, but after 4

month only 4 of 12 had WPW synrome (p<0.01). In those group of children heart failure had 30 of 54 (55.6%) and in only 2 of 77 (2.6%), p<0.001. Indipendent factors relevant for heart failure were duration of tachycardia and age and were not WPW syndrome, gender, heart rate structural heart disease. In teenagers characteristic were syncope, in 15 of 77 (29.4%) and onlz in 1 younger child (p<0.00l). From 15 teenagers with syncope 14 had atrial fibrillation in WPW syndrome,and in three atrial fibrillation degenerate to ventricular fibrillation. Indipendent factors for syncope were teenage, WPW syndrome and faster heart rate.

Conclusion: There are to age dependent groups with PSVT in high risk: infants with and without WPW syndrome because of heart rate possibility and teenage group with WPW syndrome because atrial fibrillation which could degenerate to ventricular fibrillation could appear. The first choice in infant is medical treatment and in teenagers catheter ablation.

THE ROLE OF MARKERS OF MIOCARDIAL INJURY IN THE ARRHYTHMOGENESIS IN CHILDREN

L. SVINTSOVA, I. Kovalev, T. Suslova, O. Murzina, S. Usenkov, S. Popov

Institute of Cardiology, Tomsk, RUSSIA

The aim of the study was the assessment of myocardial injury biochemical markers level and antibodies of IgG class to cardiac tissue in 42 children aged to 7 years having tachycardias and clinically valuable extrasystoles. Children with arrhythmias aged to one year revealed significantly increased level of cardiac fatty-acid binding protein (cFABP) as compared to more older children. Troponin I level did not differ in the groups and did not significantly exceed permissible values.

Analysis of prevalence of antibodies to cardiac tissues showed that there is significant increasing of antifibrillar autoantibodies in arrhythmia children compared to control group.

Thus, the results of the given study allow to suppose that maternal IgGs with subsequent forming autoimmune reactions play define role in arrhythmogenesis of children aged to one year. Autoimmune response to myocardial injury foci which occur as a result of arrhythmias becomes possible only at the age of older than 3 years in presence of a number of factors. The study results revealed that the more valuable marker is cFABP which is able to enter into the circulation even in the small but persistent injury of cardiomyocytes. However these assumptions need further studies and discussions.

COMPLEX FUNCTIONAL ASSESSMENT OF MYOCARDIUM IN CHILDREN WITH VENTRICULAR ARRHYTHMIA

O. Murzina, I. Kovalev, A. Cherhyshov, K. Zavadovski, L. SVINTSOVA, S. Popov

Institute of Cardiology, Tomsk, RUSSIA

The aim was to assess functional status of ventricular myocardium in ventricular arrhythmia children.

Material and methods: We studied 19 patients aged 12±4 years having idiopathic ventricular rhythm disturbances (VRD). Myocardial scintigraphy with Òñ99-pyrophosphate, ECG Holter monitoring, cardiac electrophysiologic study and equilibrium tomoventriculography with labeled erythrocytes (ETV) were performed. Ten patients underwent radiofrequency ablation of arrhythmia.

Results: Analysis of functional myocardial status was performed based upon ETV taking into account history data, clinical and quantitative characteristics of VRD. Pathologic QRS width negatively correlated with peak velocity of RV ejection, with RV ejection fraction and contractile velocity of RV and LV.

Level of injured myocardium markers negatively correlated with data of LV and RV contractile function. Localization of ectopic focus coincided in 84% of cases as assessed by ultrasound examination and ECG-characteristics of ventricular extrasystole. Data analysis of ETV in dependence of arrhythmia severity revealed tendency to aggravated RV systolic and diastolic indices if patients had group extrasystoles or ventricular tachycardias.

Conclusion: Adequate assessment of myocardial functional status in ventricular arrhythmia children is possible only by using the set of methods. ETV is a promising method which allow to assess severity of arrhythmogenous dysfunction and to define localization of arrhythmia focus.

QRS DURATION IS AN INDEPENDENT PREDICTOR OF DEATH IN CHAGAS DISEASE

A. RIBEIRO[1], F. Lombardi[2], P. Cavalcanti[1], M. Rocha[1]

[1] Federal University of Minas Gerais, Belo Horizonte, BRAZIL, [2] Milan University, Milan, ITALY

Purpose: In Chagas disease (ChD), a potentially lethal illness prevalent in Latin America, death is frequently sudden and malignant ventricular arrhythmia is the main mechanism of death. The value of QRS duration in the risk stratification of ChD remains controversial. The aim of this prospective longitudinal study was to determine the prognostic value of QRS duration in ChD, using multivariate models with other established prognostic predictors, and to develop a simple prediction risk score.
Methods: The study enrolled 184 ambulatory ChD patients (107 men; age: 48±12 y) in sinus rhythm and without other systemic diseases. All patients underwent comprehensive evaluation that included clinical examination, ECG, chest X-ray, 24-h Holter monitoring, echocardiogram, stress testing, and time domain SAECG. Individual medical therapy was adjusted according to a standardized treatment regimen. Patients were followed until death or until the last ambulatory visit in either 2005 or 2006. The association of potential risk factors obtained by noninvasive evaluation and death was tested by Cox proportional-hazards analysis. A prognostic score was developed considering the number of risk factors of each patient.
Results: During mean follow-up time of 74±17 months, 13 patients died. The QRS duration obtained by SAECG and by conventional ECG are highly correlated variables (r=0.89, p<0.001). Three independent prognostic factors were identified: left ventricular ejection fraction <50% (HR=7.7, p=0.014), ventricular tachycardia at either Holter monitoring or stress testing (HR=5.1, p=0.050), and prolonged (>133ms) QRS complex (HR=4.4, p=0.016). A prognostic score developed considering the number of risk factors of each patient had an excellent performance in predicting death (c statistic: 0.92).
Conclusions: Prolonged QRS duration obtained by ECG is an independent predictor of death in ChD. A prediction score including three risk factors, depressed left ventricular ejection fraction, ventricular tachycardia and prolonged QRS complex, has shown to be useful for stratifying risk categories in ChD.

RISK STRATIFICATION OF INDIVIDUALS WITH THE BRUGADA ECG PATTERN: USEFLNESS OF A POLYPARAPETRIC APPROACH FOR PRIMARY PREVENTION

G. ALLOCCA[1], E. Marras[1], P. Delise[1], G. Berton[1], N. Sitta[1], E. Moro[1], L. Sciarra[2], L. Corò[1], L. Calò[2], M. Marziali[2], A. Proclemer[3], L. Rebellato[3], R. Cazzin[4]

[1] Operative Units of Cardiology, Hospital of Conegliano., Conegliano, Treviso, ITALY, [2] Department of Cardiology, Policlinico Casilino, Roma, Roma, ITALY, [3] Department of Cardiology, Azienda Ospedaliero-Universitaria di Udine, Udine, ITALY, [4] Operative Units of Cardiology, Hospital of Portogruaro, Portogruaro, Venice, ITALY

Aim: Of this prospective study was to evaluate risk factors (RF) in an unselected population with BS without previous cardiac arrest.
Methods: From January 97 to August '08 we enrolled 118 pts (94 males, mean age 43+/- 3 yrs) with BS. 57% of them had a spontaneous ECG pattern, 43% had a pattern drug-induced. 38 were symptomatic for syncope, while 80 were asymptomatic, 45 pts had a familial history of SD. In 83 pts performed an EPS.
Results: EPS was positive in 77% among symptomatic and in 39% among asymptomatic. The study population was divided into 3 groups: 1 included 44 pts with spontaneous type 1 and 1 or more RF [syncope and/or positive family history of SD and/or positive EPS]; 2 included 21 pts with spontaneous type 1 but without RF; 3 included 53 pts with drug-induced pattern with or without RF. In Group 1 the prevalence of RF was: 57% for family history of SD, 43% for syncope and 68% for positive EPS. 50% of pts showed 2 or more RF. 68% of group 1, none of group 2 and 38% of group 3 had a positive EPS. 39 pts received a ICD. After 3 yrs (IQ 0.9-4.7) there were 8 events (7%): 1 SD and 7 VF which were interrupted by ICD. Events occurred in 5/38 among symptomatic and in 3/80 among asymptomatic, all belonged to group 1 (p=0.002) with positive EPS. In asymptomatic pts there was a trend for positive EPS (p=0.08). PPV of the EPS was 18.4% and NPV was 100%.
Conclusion: 1. The subjects at higher risk are those with spontaneous type 1 and one or more RF; 3. The subjects at lower risk are those with spontaneous type 1 without RF or with drug-induced pattern; 4. The EPS is useful in risk stratification.

POSITIVE MICROVOLT T-WAVE ALTERNANS IS ASSOCIATED WITH ORGANIC HEART DISEASE IN PATIENTS WITH VENTRICULAR ARRHYTHMIAS AND RIGHT VENTRICULAR OUTFLOW TRACT PATTERN

D. MALASPINA, F. Casazza, G. Guenzati, M. Pala, M. Bernasconi, M. Marzegalli

UO Cardiologia, Azienda Ospedaliera Ospedale S.Carlo Borromeo, Milan, ITALY

Background: It is commonly believed that occurrence of ventricular arrhythmias (VA) with a left bundle branch block (LBBB) and inferior axis suggests a right ventricular outflow tract (RVOT) or, less commonly, a left ventricular outflow tract origin. Such arrhythmias are not considered a marker of organic heart disease and therefore should have a benign prognosis, though it is well-known that a similar aspect could be seen in arrhythmogenic right ventricular dysplasia (ARVD).
Methods: Since microvolt T wave alternans (MTWA) can identify patients at higher risk of death, either after a myocardial infarction or in dilated cardiomyopathy, we submitted to such examination 18 pts (13 males and 5 females, mean age 45 years) showing VA and a RVOT pattern: 13 presented with frequent and isolated monomorphic ectopic beats, 4 with nonsustained and 1 sustained ventricular tachycardia. The entire group performed echocardiography, Holter and exercise stress testing, while myocardial SPECT imaging, magnetic resonance and coronaroangiography were obtained whenever necessary to complete diagnostic assessment.
Results: MTWA was positive in 4 pts, negative in 11 and undetermined in 3 (always due to several disturbing ectopic beats during test). All pts with negative test had no evidence of structural heart disease while in all positive-test pts we discovered some organic abnormalities: one past myocarditis, one significant stenosis of right coronary artery, one "minor" ARVD, one hypertensive heart disease. All positive patients presented simply with isolated ectopic beats.
Conclusions: 1) Among patients with VA and a RVOT pattern, positive MTWA was detected solely in pts with organic heart disease; 2) The relatively high number of indetermined results could represent a limitation of the test; 3) The clinical prognostic significance of a positive test remains to be determined in a follow-up study.

MANIFESTATION OF POSTMYOCARDIAL VENTRICULAR TACHYCARDIA: TIME ASPECT OF STRUCTURAL AND ELECTROPHYSIOLOGICAL REMODELATION

M. KOZELUHOVA, J. Bytesnik, P. Peichl, R. Cihak, J. Kautzner

Institute of Clinical and Experimental Medicine-Department od Cardiology, Prague, CZECH REPUBLIC

Background: The ventricular tachycardias (VT) after myocardial infarction (MI) are due to reentry. The extension of myocardial damage, appearance of myocardial scar and its localization seem to be important factors for occurrence of malignant VT. The aim of our study was to determine the time interval between the MI and appearance of malignant arrhythmia.
Methods: In a cohort of 322 patients with ischemic cardiomyopathy (294 men, 28 female, mean age 63±10 years) all patients were implanted with an implantable cardioverter-defibrillator (ICD) as a secondary prophylactic prevention of sudden cardiac death (SCD). We evaluated the time period from MI to the first documented malignant arrhythmia, type of arrhythmia, width of QRS, ejection fraction (EF) of the left ventricle (LV) and the impact of the scar localization.
Results: The mean MI – documented malignant arrhythmia interval was 127±102 months, at anterior MI it was 127±102 months, at inferior MI 114±96 months. All patients had significant LV dysfunction (EF 30±11%) and wide QRS complex (121±31ms). We documented 56% monomorphic sustained VT (MSVT), 31% ventricular fibrillations (VF) and 13 patients underwent a syncope as a manifestation of malignant arrhythmia. In the shortest time period appeared VF (98±93 months), than VT (140±107 months) and finally syncope (149±81 months). The period was not influenced by beta-blockers, amiodarone or ACE inhibitors.
Conclusions: The patients after MI are threatened by malignant arrhythmia also in a longer time interval from the acute coronary syndrome (10 years). The MI localization does not play a role in the MI-arrhythmia period. The VT manifestation was statistical significantly longer than VF manifestation (p=0.001). We confirmed that the patients with a prior MI are in a risk of malignant arrhythmia especially having advanced LV dysfunction and wide QRS.

ELECTROPHYSIOLOGICAL INDUCIBILITY DOES NOT PREDICT VENTRICULAR ARRHYTHMIA OCCURRENCE IN POST MI CARDIOMYOPATHY

M. RUSSO[1], G. Boriani[2], M. Lunati[3], G. Botto[4], A. Proclemer[5], W. Rauhe[6], S. Toscano[7], G. Vergara[8], A. Curnis[9], M. Merico[10], L. La Rocca[10], M. Santini[1]

[1] San Filippo Neri Hospital, Rome, ITALY, [2] Sant'Orsola Hospital, Bologna, ITALY, [3] Niguarda Ca' Granda Hospital, Milano, ITALY, [4] Sant'Anna Hospital, Como, ITALY, [5] Santa Maria della Misericordia Hospital, Udine, ITALY, [6] San Maurizio Hospital, Bolzano, ITALY, [7] L. Parodi Delfino Hospital, Colleferro, ITALY, [8] Civile Hospital, Rovereto, ITALY, [9] Spedali Civili Hospital, Brescia, ITALY, [10] Medtronic Italy, Rome, ITALY

Purpose: To evaluate the correlation of electrophysiological (EP) inducibility with spontaneous ventricular tachyarrhythmias (VTa) and all cause mortality.
Materials and methods: Survey to Evaluate Arrhythmia Rate in High-Risk MI patients (SEARCH-MI) is a European registry on the application of MADIT II results in clinical practice. EP testing was performed as a part of the Italian sub-study in order to improve stratification of these patients. A standard protocol was suggested: 600 msec and 400 msec drive trains followed by maximum 3 extrastimuli, both in right ventricular apex and in right outflow tract. The spontaneous VTa were classified as monomorphic VT, polymorphic VT and VF.
Results: A total of 104/416 Italian patients performed EP testing, 54% of them were inducible. The mean follow-up period was 16 months. Baseline characteristics of inducible and non inducible patients were similar with the exception of Spironolactone intake (higher in non inducible patients, p=0.04). 26 patients experienced at least one VTa. VF was recorded only once (non inducible patient). VTa and monomorphic VT were more frequent in patients without inducibility at enrollment but the difference was not significant (p=0.112 for VTa and p=0.069 for monomorphic VT). The yearly episode rate of VTa was 1.92 in non inducible patients versus a 2.23 in the inducible ones (p=0.29, n.s.).
Total mortality was significantly greater in non inducible patients (p=0.04); the combined end-point of total mortality and VTa was again more significant in non inducible patients (p=0.008).
Conclusion: In the subgroup of Italian patients enrolled in SEARCH-MI and undergone to EP testing the non inducibility was predictive of higher mortality rate but inducibility was unable to predict VTa during follow-up. It is possible that non inducibility is due to more severe contractile disease, thus justifying the observed higher mortality. Further analyses are required to confirm this finding and to investigate the possible underlying mechanisms.

MUTATION ANALYSIS OF ION CHANNEL GENES IN SUDDEN DEATH SURVIVORS – A PILOT STUDY

T. NOVOTNY[1], A. Bittnerova[2], A. Florianova[1], D. Kuderova[1], I. Dohnalova[1], M. Sepsi[1], M. Kozak[1], L. Krivan[1], R. Gaillyova[2], M. Raudenska[3], A. Vasku[3], O. Toman[1], J. Spinar[1]

[1] Department of Internal Medicine and Cardiology, University Hospital Brno, Brno, CZECH REPUBLIC, [2] Department of Medical Genetics, University Hospital Brno, Brno, CZECH REPUBLIC, [3] Department of Pathological Physiology, Faculty of Medicine, Masaryk University, Brno, CZECH REPUBLIC

Background: Recently published studies proved that sudden cardiac death (SCD) shows a familial occurence. It is obvious that genetically determined variations of physiological processess must exist that increase the risk of SCD. Genetic variability of SCD risk can occur in processes of electrogenesis and conduction in myocardium. In the presented project we want to test the hypothesis that such ion channel gene polymorphisms exist that increase the risk of malignant ventricular arrhythmias.
Methods: The pilot study group consisted of 39 SCD survivors (32 males, 7 females) who were resuscitated for cardiac arrest due to documented ventricular fibrillation/flutter. In all of them a cardioverter/defibrillator was implanted. In these individuals a mutation analysis of KCNQ1, KCNH2 and KCNE1 was performed.
Results: In 31 individuals structural heart disease was present (group A), in the next 8 ones a diagnosis of primary ventricular fibrillation was established (group B) LQTS and Brugada syndrome were excluded. In both groups no mutations of KCNQ1 gene were found. In group A two KCNH2 mutations were present (c.560_568del9, c.1039C>T - p.Pro347Ser). In the group B one KCNH2 gene mutation was found (c.681C>T - p.Ala228Val). None of the affected individuals showed any QT interval prolongation. In KCNE1 gene only common polymorphism G38S was found in 24 individuals from both groups.
Conclusions: In this pilot project in only 3 (1.2%) SCD survivors any mutations in KCNQ1, KCNH2 and KCNE1 genes were found. As the next step mutation analysis of SCN5A, KCNE2 and RyR2 genes will be completed. The role of polymorphisms in pathogenesis of SCD remains to be established.
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Cardiac Resynchronization Therapy: Clinical Outcome

LEFT VENTRICULAR ELECTROGRAM RECORDING TO DETERMINE INTERATRIAL CONDUCTION AND AV DELAY IN CRT-D PATIENTS

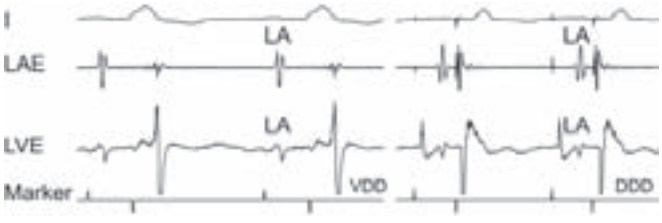
B. ISMER[1], M. Heinke[2], T. Koerber[1], W. Voss[1], B. Riedel[1], G. H. von Knorre[1], C. A. Nienaber[1]

[1] University Hospital Rostock, Department of Cardiology, Rostock, GERMANY, [2] University Hospital Jena, Department of Cardiology, Jena, GERMANY

Interatrial conduction times (IACTs) in VDD and DDD operation are fundamental determinants of the optimal AV delay (AVD). Using filtered esophageal left atrial electrogram (LAE) in cardiac resyncronization (CRT), we reported the echo validation of AVD optimization by AVD=IACT+50ms. In contrast, the St. Jude QuickOpt algorithm solely measures duration of atrial sensing deflection in VDD mode. Consequently, it has to make use of several adjustments to predict the AVD for VDD and DDD mode. IACTs in both modes could be acquired by left atrial (LA) far-field recording in left ventricular electrogram (LV).

Aims: Analysis of LA far-field in telemetric LV electrogram (LVE) to determine interatrial conduction in VDD and DDD operation.

Methods: Using Fiab esophageal Rostockfilter and Medtronic 2090AB programmer interface, LAE, LVE and Marker of 13 InSync III Marquis CRT-D patients with LV electrode on lateral or posterolateral wall were simultaneously recorded by Bard EP Lab. IACTs in VDD and DDD operation were measured between atrial marker and LA far-field deflection in LVE. Results were compared with LAE.



Results: 1. In all patients, additional amplification (2-32) and filtering of the telemetric LVE allowed LA far-field detection and IACT measurement during VDD and DDD pacing. 2. Compared with LAE, IACT divergences were 4.5±6.2ms in VDD and 7.4±7.1ms in DDD operation (k=0.94).

Conclusion: 1. In VDD and DDD operation, LA in LAE closely correlates with far-field LA in LVE. Thus, 2. The implants LVE should be enhanced to automatically measure IACT. By this way, 3. AVD in VDD and DDD CRT-pacing could be approximated by AVD=IACT+50ms.

ROLE OF INTERATRIAL CONDUCTION TIME AND AV INTERVAL MEASURED ON SURFACE ECG IN DETERMINING THE OPTIMAL AV INTERVAL IN CRT DEVICES

N. BAKHTADZE, G. Mascioli, P. Sganzerla, E. Lucca, E. Perlasca, A. Borrelli, E. Borghini, B. Passaretti, E. Vitali

Cliniche Humanitas Gavazzeni, Bergamo, ITALY

CRT has become a very important tool for the treatment of patients with congestive heart failure (CHF) refractory to optimed medical therapy and enlarged QRS. Provided that the left ventricular lead has been implanted in a target vein, a further improvement in left ventricle performance can be obtained optimizing the A-V intervals (OAV) of the device.

We tried to determine if OAV depends on the duration of the interatrial conduction time (IACT) or on the duration of AV interval measured on surface ECG.

To measure the IACT we inserted – during the device implant – a tetrapolar catheter distally into the coronary sinus: the IACT was considered as the interval between the earliest P activation on the surface ECG and the A wave on the distal couple of electrodes into the CS. Since January 2008, 14 patients (11 males, mean age 68±5 yrs, range 61–75) were implanted with a biventricular device for severe CHF; 8 pts had an ischemic cardiomyopathy and 6 a non ischemic one. Mean QRS duration was 190±26 msec, mean surface ECG AV interval 171±17 msec and mean IACT 91±14 msec. The AV was considered optimized when the chosen AV interval produced the largest transmitral flow curve integer at echo.

We found a significant direct correlation between surface ECG AV interval and OAV (r value 0.74): the longer the surfae ECG AV interval the longer the OAV; surprisingly, we found an inverse significant correlation between IACT and OAV (r value – 0.73): the shorter the IACT the longer the OAV.

In conclusion, our very preliminar data seem to suggest that there is a good relationship with OAV both for IACT and surface ECG interval.

THE DIFFERENCE OF OPTIMAL AV DELAY BETWEEN LEFT AND RIGHT HEART IN PATIENTS WITH CARDIAC RESYNCHRONIZATION THERAPY

C. SUGA[1], Y. Sugawara[1], T. Hirahara[1], K. Arao[1], S. Momomura[1], K. Matsumoto[2]

[1] Jichi Medical University Saitama Medical Center, Saitama, JAPAN, [2] Saitama Medical University International Medical Center, Saitama, JAPAN

Purpose: Optimal AV delay (OAVD) is generally set up to left heart OAVD in patients with cardiac resynchronization therapy (CRT). However, there may be difference between left and right heart OAVD in association with atrial and/or ventricular conduction disturbance leading to atrial and ventricular dyssynchrony since CRT does not warrant complete synchronization of the heart. The purpose of this study was to evaluate the difference of OAVD between left and right heart and to determine the cause of the difference of OAVD in CRT recipients.

Method: This study included 10 CRT recipients who were echocardiographically evaluated left and right OAVD (8 Males, mean age 64.1+/-13.9 years). We calculated the difference of left and right heart OAVD (d-OAVD), and assessed any relationship between d-OAVD and age, BNP, NYHA class, LVEDD, LVEF, LAD, paced P width and QRS width before and after implantation of CRT device.

Results: Averaged d-OAVD was 25.1+/-30.8 (0-97) msec. There were no correlations between d-OAVD and age, BNP, NYHA class, LVEDD, LVEF, LAD and QRS width before and after CRT (p=NS). However, d-OAVD significantly correlated with paced P width (r=0.7, p=0.0242).

Conclusion: There was a maximum of 97msec d-OAVD suggesting an association with intra-atrial conduction disturbance. Alternative atrial pacing site which improves intra-atrial conduction might be useful to reduce d-OAVD, though hemodynamic significance of d-OAVD is yet unknown.

POSTOPERATIVE CHANGES OF BLOOD PRESSURE PROFILE AFTER CRT SYSTEM IMPLANTATION: A 24H-AMBULATORY BP MONITORING STUDY

I. BERTOLOZZI, A. Pucci

Cardiologia e Cardiostimolazione, Ospedale di Carrara, Carrara, ITALY

Background: Several studies have shown that biventricular pacing acutely improves hemodynamic status. Although no data are available about the 24 h blood pressure profile in the early phase after CRT system implantation. Ambulatory blood pressure monitoring (ABPM) is an accepted tool for the evaluation and management of hypertension, but its use in heart failure has received less attention and no studies were performed in normotensive heart failure patients who received CRT.
Methods: Ten normotensive patients (68±8y, 80% males) scheduled to undergo CRT implantation for severe heart failure (NYHA III), left ventricular dysfunction (EF < 30%) and LBBB were enrolled in the study. 24h ABPM was performed by SpaceLabs 90207 device on the day before implantation (day -1) and immediately after the surgical procedure (day 0). The oral therapy on day -1 and 0 remained unchanged. 24h-ABPM recordings were analysed and mean values of 24h, day time, night time systolic, diastolic and differential BP were calculated.
Results: All patients were in sinus rhythm. QRS duration significantly decreased after CRT (147±20 vs 115±16 msec, p<0.01), preoperative EF was 25±6% and mildly increased after operation (30±5 mmHg). Mean 24 h and day time (8-22) systolic BP significantly increased after CRT (24 h SBP day -1: 110±14; 24h SBP day 0: 119±11, p<0.05; 8-22 SBP day -1: 112±13, 8-22 SBP day 0: 122±12mmHg, p<0.005). 24h and day time diastolic blood pressure mildly increased after operation (24h DBP 70.3 ±4 vs 62±4 mmHg, p<0.05). No significant changes of differential BP and night time BP (systolic and diastolic) were found.
Conclusion: CRT acutely modified 24 BP profile in normotensive heart failure patients. 24h systolic and diastolic BP significantly increased on the day of surgery, while no significant changes of mean pulse pressure and night time BP were detectable.

IMPACT OF CRT ON PHYSICAL ACTIVITY ENERY EXPENDITURE: AN AMBULATORY MONITORING PILOT STUDY

A. PROCLEMER[1], D. Facchin[1], P. Miller[2], P. Yang[2], T. Marotta[3]

[1] AZ. Osp. Santa Maria d. Misericordia, Udine, ITALY, [2] Therapy Delivery Systems-Medtronic, Minneapolis, USA, [3] Medtronic Italy, Milan, ITALY

Introduction: The Minnesota Living with Heart Failure Questionnaire (MNQoL) is a commonly used subjectively measure of health-related quality of life in HFpatients. Objective physical active energy expenditure (PAEE) monitoring may be a better way for assessing the disease status and response to a therapy in free-living conditions, where no gold-standard field measure exists. The PAEE monitor is based on ambulatory 3axis accelerometer data recorder. This pilot study results provided a new insight for improving assessment of heart failure disease status and responses to CRT by PAEE monitoring.
Methods: We studied 9HF patients (mean age 72±11y; NYHA 2.5±0.7; LVEF24.5±9.1%), who were scheduled for CRT implant. The patients were asked to wear a special shirt fitted with a small, cell phone sized PAEE monitor near the chest over three separate week-long sessions: 1week prior to CRT implant, 1week and 3month post CRT implant. The PAEE monitor records 3orthogonal vectors continuously at 50hertz for 5days. The daily PAEE from 7am to 11pm was estimated from the 3axis acceleration vectors using a newly developed algorithm based on a non-linear model. Two patients were excluded from the analysis due to incomplete data collection.
Results: The daily PAEE was compared to MNQoL score. The patients felt much better according to MNQoL after 1week post-implant. However, their average daily PAEE reduced 30% of the pre-implant PAEE. After 3m CRT, the average daily PAEE increased 17% of the pre-implant PAEE, which is consistent with improvement of the MNQoL score. Furthermore, 4/7patients increased the daily PAEE (12~133%) but other 3patients remained or decreased the daily PAEE after 12weeks CRT.
Conclusion: The PAEE monitor was developed and first-time used for monitoring of HFpatients in free-living conditions. The daily PAEE monitoring might provide useful information for assessment or optimization of responses to CRT, but further larger patient population study is warranted.

NON INVASIVE EVALUATION OF FUNCTIONAL AND EMODYNAMIC CAPACITY: EFFICACY AND RELIABILITY IN CRT PATIENTS

E. BARBARESI, N. Rizzo, A. Balducci, S. Stabellini, L. Bacchi Reggiani, E. Filippini, S. Specchia, G. Boriani, A. Branzi

Institute of Cardiology, University of Bologna, Bologna, ITALY

Purpose: Cardiac Resynchronization Therapy (CRT) improves functional capacity and survival in patients with Heart Failure (HF) and Left Bundle Branch Block (LBBB). Instead little is known regarding the evaluation of cardio-pulmonary capacity and emodynamic changes during exercise.
Materials and methods: 8 patients (all male, 54±7 years, NYHA II-III, ejection fraction <30%, Left Ventricular End Diastolic diameter >70mm, mitral regurgitation III-IV) in CRT during the last 6 months were matched with 8 patients with the same characteristics, on optimal pharmacologic therapy but without CRT. The two groups underwent: a) a complete cardiopulmonary exercise test (CPET), b) a non-invasive evaluation of cardiac output and other emodynamic parameters. The non-invasive evaluation was based on Innocor system using an O2 enriched mixture typically containing 0.5% nitrous oxide (N2O) and 0.1% sulphur hexafluoride (SF6).
Results: Patients on CRT showed a higher increase in Cardiac Output (CO) at peak exercise compared with patients without CRT (8.2±0.8 l/min vs 5.7±0,9, p<0.001). In addiction patients in CRT presents a more favourable, even if not significant, VE/VCO2 slope compared with patients without CRT (27.6±4.7 vs 31.5±7, p=NS). Moreover, patients in CRT showed a trend of higher increase in VO2 compared with patients without CRT (22±1.7ml/kg/min vs 18.5±5 ml/kg/min, p=NS).
Conclusion: Our study confirms previous results regarding the efficacy of CRT in patients with HF, showing the improvement of exercise capacity by a significant strong increase of CO. The other CPET parameters have a similar trend but are not statistically significant (p>0.05) because of the small size of our study population. Moreover it shows that non invasive Innocor system represents a very interesting method for functional and homodynamic capacity evaluation during exercise. These results strongly recommend the use of this method in patients with HF, especially in the selection of those patients who needs CRT.

Catheter Ablation of Supraventricular Tachycardia

RADIOFREQUENCY TRANSCATHETER ABLATION OF REGULAR SUPRAVENTRICULAR TACHYCARDIAS: LONG-LASTING EFFICACY ON ATRIAL FIBRILLATION RECURRENCES

E. HATZINIKOLAOU-KOTSAKOU[1], G. Moschos[1], E. Reppas[1], Th. Beleveslis[1], N. Brelas[2], S. Abatzis[3], K. Tsakiridis[1]

[1] Saint Lukas Hospital, Thessaloniki, GREECE, [2] Regional General Hospital, Trikala, GREECE, [3] Regional General Hospital, Didimoticho, GREECE

Background: Regular Supraventricular Tachycardia (SVT) such as atrioventricular re-entry nodal tachycardia (AVNRT) and atrioventricular re-entry tachycardia (AVRT) have been reported as triggers for atrial fibrillation (AF) recurrences. Radiofrequency transcatheter ablation (RFTCA) for these SVTs has a success rate of more than 92%.
Aim: The verify the usefulness and the safety RFTCA of these regular SVTs in a selected study group with associated episodes of paroxysmal AF, as well as the recurrence of AF after efficacious RFTCA.
Methods: The study population consisted by 156 patients of whom 98 males with mean age of 52±21 years who underwent electrophysiological studies (ES) and RFTCA for AVNRT (96 patients and AVRT (60 pts), with associated episodes of AF (AVNRT/AF: 96/21, AVRT/AF:60/12) and with a pre-RFTCA average recurrence of paroxysmal AF of 4+6 episodes per year. All the patients had echocardiograms, underwent ES and RFTCA and stopped all antiarrhythmic medications after RFTCA procedure.
Results: Out of the total RFTCA procedures for above mentioned SVTs with associated AF, a complete success was obtained at the first procedure in all patients. Clinical follow-ups were programmed at 1, 4, 8, 12, 24 and 32 months. During the follow-up no recurrence of AF was documented.
Conclusions: The RFTCA for AVNRT and AVRT is a safe and efficacious procedure with good long lasting results. The absence of a recurrence of AF even during the limited study periods, without antiarrhytmic drugs, can most likely be attributed to the elimination of the regular SVT as a possible AF trigger.

RADIOFREQUENCY ABLATION BY CARTO-MERGE OF ATRIAL TACHYARRHYTHMIA'S IN ADULTS UNDERGOING CORRECTION OF CONGENITAL HEART DEFECTS: PRELIMINARY DATA

M. GIACCARDI[1], A. Colella[2], S. Favilli[3], I. Pollini[3], R.M. Bini[3], G.F. Gensini[2]

[1] Dept. Cardiovascular Rehabilitation, Don Gnocchi Foundation, Firenze, ITALY, [2] Dept. Heart and Vessels-AOU Careggi, Firenze, ITALY, [3] Pediatric Cardiology-AOU Meyer, Firenze, ITALY

Background: Arrhythmias, are the most frequent complication after surgical correction of congenital heart defects (CHD) and represent the most common cause of hospitalization and deterioration in the quality of life (QoL). Interventions radiofrequency ablation beginning to yield good results, especially in light of several new mapping techniques.
Methods: In this study 9 patients (60% males, 48.4±15.8 years), which had different types of atrial tachyarrhythmia's (Atrial fibrillation; Atrial Flutter; Atrial tachycardia) as a result of CHD correction, was studied with an electroanatomical study with an integrated images acquired by TC multilayer (Carto Merge system, Biosens e Webster) and ablation of arrhythmia was performed. The 2 pts with FA were subjected to encircling of pulmonary veins and ablation of left and right isthmus, the 3 pts with typical atrial flutter has undergone ablation of cavo-tricuspid isthmus; the 4 pts with atrial tachycardia were subject to ablation of functional and anatomic block zones. We have evaluated, the acute success of radiofrequency ablation, the arrhythmic relapses during the follow-up (12 months), the hospital admissions for arrhythmia and QoL through a validated questionnaire (Italian SF-36).
Results: The atrial tachycardia and atrial flutter were ablate successfully with restoration of sinus rhythm (SR). Patients with FA have needed to electrical cardioversion at the end of procedure to restore SR. No major complication was recorded. At follow-up only 1 pts (12%) with persistent AF was relapsed. The hospitalizations for arrhythmia were significantly reduced to a follow-up (4.4±0.7 vs 0.5±0.1 days, p<0005) and QoL was significantly improved (p<0.05).
Conclusion: Our preliminary data shows that: 1) the ablation of atrial tachycardias using an electroanatomic integrated mapping system (Carto Merge) is effective and safe in patients with CHD; 2) ablation of these arrhythmias, reducing hospitalizations and improve QoL, could reduce health costs.

CRYOABLATION OF THE SLOW PATHWAY IN PATIENTS WITH AVNRT: THE ROLE OF PATIENT AGE

C. LAVALLE, S. Ficili, M. Galeazzi, M. Russo, A. Pandozi, C. Pandozi, M. Santini

Department of Cardiology, San Filippo Neri Hospital, Rome, ITALY

Aim of the study: Radiofrequency (RF) ablation of the nodal slow pathway is now considered the first-line treatment of patients with recurrent atrioventricular nodal reentrant tachycardia (AVNRT). Cryoablation of the slow pathway has recently emerged as an alternative to radiofrequency in patients at higher risk of AV block. Aim of the study was to establish the efficacy and safety of the slow pathway cryoablation in the adult population, correlating the success of the procedure with age of the patients.
Material and Methods: Thirty-eight consecutive patients (mean age 44.3±17) with documented parossistic supraventricular tachycardia underwent electrophysiological study and in those with an AVNRT a catheter cryoablation was performed. Of these 38 patients, 34 had an AV nodal re-entrant tachycardia. Cryomapping was performed at -30° for 60s to validate the ablation site. Cryoablation was performed at -75°. The parameters used to define a successful procedure were the noninducibility of the AVNRT or the disappearance of the dual AV node physiology.
Results: The procedure was successful in 27/34 patients (79%). During cryomapping in three patients a transient AV block was observed. To evaluate if a correlation exists between success of the procedure and age, the patients were divided in to 3 groups of age: less than 30yrs (7 pts), between 30-60 yrs (15 pts) and >60yrs (12 pts). In the first group the procedure was effective in all 7 patients, in the second group in 14/15 pts and in the third group 4/12. The difference between both the first and second group and the third group was statistically significant (group 1 vs group3 p=0.013, group 2 vs group 3 p=0.005).
Conclusions: In our experience cryoablation of AVNRT results safe. Its efficacy has shown to be similar in terms of acute success with those obtained with RF in young adults (<30yrs) and in patients less than 60 yrs old. Its efficacy is remarkably reduced in the elderly. A possible explanation of this difference is the greater degree of fibrosis, the atrial dilatation and a larger Koch triangle observed in the

elderly patients which may reduce the efficacy of cryoablation. We believe that cryoablation may be used as a valid and safe alternative in the treatment of AVNRT in patients < 60yrs old but should not be considered in the elderly.

SLOW PATHWAY CRYOABLATION FOR ATRIO-VENTRICULAR NODAL RE-ENTRANT TACHYCARDIA: A SINGLE CENTRE EXPERIENCE STUDY

F. Gueffaf, A. De Sisti, J. Tonet, J.F. Leclercq, F. Touil, PH. Aouate, J. Lacotte, F. Hidden-Lucet, R. Frank

Rhythmology Department, Cardiology Institut, Pitié-Salpetriere Hospital, Paris, FRANCE

Aim: Evaluation of acute and long-term safety/effectiveness of AVNRT cryoablation.
Methods : We included 150 consecutive pts with AVNRT, who underwent slow pathway cryoablation. Mean age was 39±14 years,, and number of ineffective antiarrhythmic (AA) drugs 1.9±1.3. A 7 Fr 6-mm-tip cryocatheter was used. After successful cryomapping (-30°C; n=7.6±7.6 per pt) defined as jump abolition or AV nodal refractory period prolongation, cryoablation was applied (-80°C for 4 min) if no AV-block (AVB) occurred. AVNRT induction was checked 30 min later with and without isoproterenol infusion. A residual isolated echo was permitted.
Results: In 34 pts a freezing-thawing-freezing cycle of 4+4 min at the effective site was performed. AVNRT non-inducibility was achieved in 104/112 pts (93%), and a residual echo elicited in 14. Inadvertent transient AV-block was encountered in 34 patients (22.7%). At hospital discharge all AA drugs were withdrawn, including also patients with unsuccessful procedure. During a follow-up of 18±10 months, 116 patients (79%) were recurrence-free (including also 2 patients with unsuccessful procedure). When considering successful procedure, 118/142 (83%) pts were recurrence-free. After the first disabilitating recurrence, an AA drug was reintroduced in 27 pts (with no relapse in 5 and reduction in AVNRT duration-frequency in other 5), while 5 pts had a reduction of AVNRT duration-frequency episodes without any treatment. Twelve pts without improvement despite reintroduction of an AA drug underwent a further cryo-procedure, after which 9 had no recurrence. In pts with successful procedure, residual jump (39 pts), AV nodal refractory period prolongation (48.6±44ms), isolated echo (14 pts), and freezing-thawing-freezing cycle were not correlated with recurrence.
Conclusions: Slow pathway cryoablation is associated with a considerable acute success but a higher recurrence rate. An isolated residual echo does not influence the clinical outcome, as well as an adjunctive consolidation cryo-application.

WPW SYNDROME AND ASYMPTOMATIC PREEXCITATION: INCIDENCE OF TACHYCARDIA AND SUDDEN DEATH IN A SOUTHERN ITALIAN POPULATION

S. IACOPINO[1], G. Fabiano[1], P. Sorrenti[1], A. Talerico[1], G. Campagna[1], M. Salierno[2], G. Colangelo[1], R. Alemanni[1]

[1] Sant'Anna Hospital, Catanzaro, ITALY, [2] Boston Scientific, Milano, ITALY

Background: Ventricular fibrillation (VF) and subsequent sudden death (SD), even if rare, generally develops in WPW syndrome, most of whom have a previous episodes of atrial fibrillation (AF), but it can also be the first clinical event in asymptomatic subjects.
Aim: To evaluate the incidence of tachycardia and arrhythmic SD in consecutive patients with symptomatic and asymptomatic pre-excitation.
Methods: Between January 2005 and January 2008, in a study population of 1562 consecutive patients who underwent catheter ablation (CA) for symptomatic supraventricular tachycardia, 157 patients (10%) (92 men, mean age 38.1+22.3 years) with WPW syndrome underwent CA for atrio-ventricular reentrant tachycardia (AVRT) (up to 60% with history of atrial fibrillation). In the same period, they have reached our observation 54 asymptomatic subjects (29 men, mean age 44.3+32.1 years) with preexcitation.
Results: Between symptomatic patients, in 95 (60.5%) the accessory pathway (AP) was located to left, and 11 patients (7.0%) had multiple APs. In twelve patients (7.6%) the AP was located in right anteroseptal (AS) region. Seven patients (4.5%) had syncope, and one patient (0.6%) it has been resuscitated from SD due to VF. CA was acutely successful in 100%. One asymptomatic subject (1.8%), a 63 year old man, had syncope due to atrial fibrillation with high ventricular rate and short R-R interval (170ms) that required electrical cardioversion and later CA. The 2-year survival rate was 100% in both population.
Conclusions: CA is safe and effective in WPW syndrome. In this population the incidence of sudden death was 0.6% in symptomatic patients, but "aborted" sudden death was 1.8% in asymptomatic subjects. A careful clinical and electrophysiological evaluation is mandatory in WPW ECG pattern. Prophylactic ablation performed by an experienced operator may be highly effective in preventing unexpected events.

REMOTE MAGNETIC CATHETER MAPPING AND ABLATION OF FOCAL ATRIAL TACHYCARDIA IN A PATIENT WITH COMPLEX TRANSPOSITION OF GREAT ARTERIES AND THE FONTAN CORRECTION

J. SKODA[1], P. Neuzil[1], L. Sediva[1], J. Petru[1], J. Popelova[1], M. Taborsky[1], V. Reddy[2]

[1] Na Homolce Hospital - Dept.of Cardiology, Prague, CZECH REPUBLIC, [2] University of Miami Hospital - Cardiac Electrophysiology, Miami, USA

Introduction: We report on a 23-year-old female patient with d-transposition of great arteries, and large ventricular septal defect (functional univentricle) after subsequent Glen and Fontan correction. An electrophysiologic study discovered a focal atrial tachycardia from right midseptal region. Using the magnetic navigation system, remote-controlled ablation was performed in conjunction with the 3D electroanatomical mapping system and CT registration. A retrograde transaortal aproach was feasible to map entire right and left atrium and successfully guide ablation near the His region. Fluoroscopy and procedure time was 7 and 125 minutes respectively. There is no tachycardia reccurence in 7 month follow-up.
Conclusion: Remote-controlled catheter ablation using magnetic navigation with the electroanatomical mapping system appears beneficial in complex Fontan patient. It facilitates a transaortal mapping and ablation in both atria instead of a puncture of total cavopulmonary connection.

THE DYNAMICS OF ECHOCARDIOGRAPHY PARAMETERS IN HEART FAILURE PATIENTS AFTER CARDIAC RESYNCHRONISATION THERAPY

YU.A. Schneider[1], N.M. ROGACHEVA[1], P.V. Krasnoperov[1], S.R. Kuzmina-Krutetskaya[1], V.A. Basova[2], K.V. Kuznetsov[1]

[1] Medical Academy of Postgraduate Study - Department of Cardiovascular Surgery, St.-Petersburg, RUSSIA, [2] Medical Academy of Postgraduate Study - Department of Functional Diagnostics, St.-Petersburg, RUSSIA

Aim: to assess the dynamics of Echo parameters in HF patients before and after CRT.
Materials and methods: 21 patients (M-19, 59±7 years) with cardiomyopathy were enrolled in the study. 2 patients had II NYHA class of HF, 16 patients had III NYHA class, and 3 patients were in IV NYHA class. 8 patients had permanent AF. 18 patients had complete LBBB. 2 patients with complete AV block and permanent RV pacing also were included in the study. We assessed LV systolic function, mitral regurgitation (MR) and intensity of dyssynchrony. Time of observation was 20±3 months. Echo data were compared at baseline, in a 7 days and in a 12 months after CRT device was implanted.
Results: Intrinsic QRS duration was 160±32ms. Initial parameters of LV systolic function were EF (Simpson's rule) 27±7%, VTI 14±4sm, dP/dt 486,5±56mm Hg/s, LVEDD/LVESD 71±5/59±9mm, LVEDV/LVESV 274±60/187±38ml. MR degree was 2,4±0,6. All patients had dyssynchrony: interventricular mechanical delay (IVMD) was 56±15ms, preejection aortic time – 176±35ms, lateral wall contraction delay – 190±52ms.
Clinical characteristics in a 12 months after CRT were improved: NYHA class decreased on 1 level (p=0.015). QRS duration was reduced to 137±20ms (ns). There were positive Echo dynamics. LV systolic function value was improved: EF 37±8% (p=0.001), VTI 20,5±6sm (p=0.001), dP/dt 720±64mm Hg/s (p<0.001). LVEDD/LVESD decreased to 68±3/55.6±5mm (p=0.036), LVEDV/LVESV reduced to 218±46/156±42ml (p=0.001). MR degree reduced to 1.6±0.9 (p<0.001). Intensity of dyssynchrony: IVMD12.8±6ms (p<0.001), preejection aortic time 174±38ms (p=0.003), lateral wall contraction delay 59.6±23ms (p<0.0001).
Conclusions: Echo criteria of dyssynchrony are the most informative for selection of patients for CRT. Echo is effective method for optimizing CRT systems. CRT with optimal medical therapy leads to reversion of LV remodeling, significantly reduces the degree of MR, improves the systolic function and clinical status.

IS THE INTERVENTRICULAR CONDUCTION DELAY RELEVANT? CLINICAL PERFORMANCE OF LEFT VENTRICULAR AND BIVENTRICULAR PACING IN THE RENEWAL 4 AVT STUDY

A. QUESADA[1], A. Medina[2], J. Vogt[3], J. Alzueta[4], J. Muñoz[5], P. Yong[6], J. Sperzel[7], S. Favale[8], D. Exner[9], R Wentkowski[5], J. Jimenez[1]

[1] Hospital General de Valencia, Valencia, SPAIN, [2] Hospital de Gran Canaria Doctor Negrin, Las Palmas, Las Palmas, SPAIN, [3] Heart and Diabetes Center, Bad Oeynhausen, GERMANY, [4] Hospital Clinico de Malaga, Malaga, SPAIN, [5] Boston Scientific, Brussels, BELGIUM, [6] Boston Scientific, St Paul, MN, USA, [7] Kerckhoff-Heart Center, Bad Nauheim, GERMANY, [8] Osp. Policlinico di Bari, Bari, ITALY, [9] Foothills Medical Centre, Calgary, CANADA

Purpose: Comparisons of left ventricular (LV) pacing only and biventricular BiV pacing have not been extensively studied.Â In the evaluation of RENEWAL 4 AVT CRT-D, we studied as a primary endpoint if LV pacing achieves the same results than BiV pacing when they are applied in a tiered way according to the degree of interventricular conduction delay (IVCD).
Methods: Pts were assigned to either LV only or BiV CRT and followed for 6 months. Assignment was based on the IVCD measured between right and left-sided R-waves from real-time electrograms. Pts with IVCD > 105ms were assigned to LV only pacing and those with IVCD < 105 ms were assigned to BiV. The primary outcome was a weighted composite score based on changes in six minute walk (6MW) and LV endsystolic diameter (LVESD) and compared to a target value of 50 points.
Results: Data were available for 102 pts (61 LV 41 Biv -aged 68±9 and 67±8 y; male 83%, 75% respectively. Baseline QRS width (177±24 vs 151±24 ms, <0.01), LVESD (62±11vs 57±10 mm,0.02) and
IVCD (135±21 vs 57±32 ms, <0.01) were significantly different between LV and BiV groups, respectively . At 6 m FU, all parameters in LV group had significantly (<.01) improved (score 101±91, LVESD 8.5±14.4 mm, 6MW 45±73, QoL -24±18 points, % ptes NYHA Class improved 87) regarding basal values. In the BiV group these differences were significant only for 6MW (45±73), QoL(-24±18) and % NYHA Class change (87%).
Conclusion: In the RENEWAL 4 AVT study, both LV only and Biv pacing demonstrated significant improvement in symptoms, 6MW, and QoL. However, only LV CRT met the performance objective. These findings also support the interventricular conduction delay as a predictor of better response to CRT. Further studies are needed to confirm these results.

ECHOCARDIOGRAPHIC OPTIMIZATION OF CRT DEVICES. AN USEFUL TOOL

V. MARIONA[1], V. Moñivas Palomero[2], I. Fernandez Lozano[1], J. Toquero Ramos[1], V. Castro Urda[1], J. Gonzalez Mirelis[3], L. Pulpon Rivera[3]

[1] Hospital Universitario Puerta De Hierro/Department Of Arrhythmya, Madrid, SPAIN, [2] Hospital Universitario Puerta De Hierro/Department Of Echocardiography, Madrid, SPAIN, [3] Hospital Universitario Puerta De Hierro/ Department Of Cardiology, Madrid, SPAIN

Introduction: Cardiac resynchronization therapy (CRT) requires optimization of stimulation intervals. However, is yet unknown which is the best method and the ideal time interval between optimization procedures (OP). We studied 32 consecutive patients in whom a CRT device was implanted. Before discharge we perform echocardiographic atrioventricular (AV) interval optimization by Ritter method and interventricular (VV) optimization by programming the interval with the lowest intraventricular dyssinchrony value. Mean patients age was 57.9±8.3 years, 13% were women, coronary artery disease was present in 38.7% of patients. We conducted a follow up OP at 6 months.
Results: After 6 months of follow up, there was a significant improvement in ejection fraction (EF%: 26.2±7 vs 35.2± 8, p= 0.001) and stroke volume (SV mL: 161.4±62 vs 131.8±72, p= 0.007) in comparison with basal parameters. The left ventricle end-systolic volume (LVESV) undergoes a reduction of at least 10% in 65% of patients. The variation in the AV and VV intervals programmation between basal and follow up (at 6 months) OP did not reach statistical significance (AV p = 0.26, VV p= 0.69), although this intervals had to be modified in 78% (n = 25) of patients in the second OP.
Conclusion: CRT with ecocardiographic optimization of AV and VV intervals is associated with a reduction of at least 10% in the

LVESV in the 65% of patients and with a significant improvement in EF and SV in most of patients during follow-up. Simpler and faster methods that allows an adequate optimization during follow up are needed.

TRANSESOPHAGEAL LEFT VENTRICULAR CONDUCTION DELAY IN HEART FAILURE PATIENTS WITH LONG-TERM BIVENTRICULAR PACING

M. HEINKE[1], B. Ismer[2], R. Surber[1], H. Kühnert[1], D. Eisenträger[1], G.H. Von Knorre[2], T. Heinke[3], G. Dannberg[1], D. Prochnau[1], M. Ferrari[1], H.R. Figulla[1]

[1] Department of Internal Medicine I, Cardiology Division, University of Jena, Jena, GERMANY, [2] Department of Internal Medicine, Cardiology Division, University of Rostock, Rostock, GERMANY, [3] Siemens AG Healthcare Sector, Rudolstadt, GERMANY

Purpose: Cardiac resynchronisation therapy (CRT) by biventricular (BV) pacing is an established therapy for heart failure (HF) patients with interventricular conduction delay, but not all patients improve clinically. Aim of this study was to test the utilization of the esophageal left ventricular conduction delay (LVCD) as a predior for responders to CRT.

Materials and methods: Prior to implantation of CRT systems, LVCD of 18 HF patients (3 females, 15 males, age 62±9 years) in NYHA class 3.1±0.3, LV ejection fraction 22±7%, left bundle branch block and a QRS duration (QRSD) of 171 ± 27 ms were analysed by measuring LVCD between onset and offset of the LV deflection in the directed transesophageal bipolar left ventricular electrogram (LVECG) which was recorded using hemispherical electrodes (TO, Osypka, Reinfelden, Germany).

Results: Within 14±14 months median follow up, 14 of the 18 patients with LVCD of 75±19 ms and QRSD/LVCD ratio of 2.5±1.0 were clinically classifed as CRT responders characterized by reclassification of NYHA class from 3.1±0.3 to 2.0±0.5 ($p<0.001$) as well as increase in LV ejections fraction from 22±7% to 36±11% ($p=0.001$). Comparing BV pacing and intrinsic rhythm, impedance cardiography showed significantly higher cardiac output 4.7±1.9 l/min vs 2.7±1.1 l/min ($p=0.0026$) and contractility index (0.040±0.013/s vs 0.025±0.01/s ($p=0.0044$). In contrast, LVCD of the 4 nonresponders was 120±16 ms ($p<0.001$) with QRSD/LVCD ratio of 1.5±0.2 ($p=0.086$). Mean QRSD did not significantly differ between responders and nonresponders (170±31 ms vs 174±10 ms, p=n.s.).

Conclusion: Directed LVECG may be a simple and useful tool to measure LVCD in heart failure patients in order to predict their response to CRT.

THE WAY OF OPTIMISATION INTRAVENTRICULAR CONDUCTION DELAY IN PATIENTS WITH IMPLANTABLE CRT

M. ZEMLYANOVA, E. Karpushkina, M. Mazilov, A. Semagin, J. Tracht, S. Khokhlunov

The State Clinical Cardiological Dispensary, Samara, RUSSIA

Objectives: Optimization intraventricular conduction delay (VV-delay) to improve efficacy of resynchronization therapy.

Methods: 9 patients, middle age 48.5±10.9 (41-60) with severe congestive heart failure (CHF). Etiology factors of CHF were: cardiomyopathy – 5 patients, coronary disease – 4 patients. QRS was 150.3±35.6 ms, ejection fraction (Simpson) 24.9±4.9%, diastolic volume 284±124.5 ml, output volume 74.7 ± 30.8 ml. Aortic preejection delay (Ao/LV) 152.6±45.7 mc, VV-delay 46.8±32.4ms. BNP was 330.7±171.5 pg/dl. We considered the optimal VV-delay value when the output volume was maximum and VV-delay was not more than 40 ms. The follow-up was 9,6±3,4 months.

Results: We observed to improve clinical status in all patients during the first month after operation. QRS reduced from 150,3±35,6 to 107,3±32,2 ms.

Output volume was maximum on RV/20 ms (right ventricular was the first) – 108.3±12.7ml and RV/5ms – 106.8±15.6ml. The lowest output volume was on LV/20 (left ventricular was the first) – 62.8±13.7 ml and then was increasing to 90.3±14.8 ml on LV/5. VV-delay was 73.4±3.7ms (RV/20 ms) and 68.3±2.3 ms (LV/20). Optimal VV-delay was 21.3±15.6 ms (RV/5, LV/5). In that case Ao/LV was 156.1±87.6 ms.

We programmed RV as the first chamber for stimulation in 5 cases, LV as the first chamber – 2 cases and both RV and LV for synchronous stimulation – 2 cases.

The examination of patient clinical status after 9 months biventricular stimulation has showed us the following results. Diastolic volume has not changed significantly (236±27.9ml), output volume has increased to 113.7±17.3, ejection fraction (Simpson) has increased to 36.4±7.2% *($p<0.05$).

Conclusions: When we need optimized VV-delay and choose the first chamber for stimulation it is important to compare volume dates with VV-delay dates and choose those intraventricular conduction delay which shows maximum output and minimum VV-delay.

REVERSE REMODELING AND CLINICAL OUTCOME TO CARDIAC RESINCHRONIZATION THERAPY

F. CABRERA-BUENO, J Peña-Hernandez, J Fernandez-Pastor, A Linde-Estrella, J Alzueta-Rodriguez, A Barrera-Cordero, Jm Garcia-Pinilla, E De Teresa Galvan

Hospital Universitario Virgen De La Victoria, Malaga, SPAIN

Introduction: It has been used both clinical and echocardiographic terms to evaluate the response to Cardiac Resynchronization Therapy (CRT), however, correlation between them have been poorly described.

Objectives: We aimed to study if the absence of reverse remodeling during the follow-up in patients successfully implanted with a CRT device is associated with a worse clinical evolution.

Methods: This retrospective study included 86 patients who fit current indication for CRT. It was performed a complete echocardiographic study at baseline and 6 months after the device implantation. We studied the possible relationship between the presence of significant reverse remodeling (defined as the reduction of left ventricle end-systolic volume (LVESV) equal or more than 10%) and the occurrence of cardiac adverse events during follow-up (death, transplantation and admission because of heart failure).

Results: Over a mean follow-up of 14±10 months, we documented cardiac adverse events in 19 patients (7 deaths and 12 heart failure admissions). Patients showing a worse clinical evolution had in baseline echocardiography larger left ventricular end-diastolic (259±62 vs 205±87ml; p=0.024) and end-systolic volumes (204±57 vs 165±72 mL; p= 0.034). They also showed a wider stimulated QRS complex (136±15 vs 123±16 ms; p=0.02) and a smaller reduction of the LVESV (8±19% vs 32±26%; p=0.008) at 6 months. We identified that the absence of significant reverse remodeling was as an independent predictor of a worse clinical evolution (OR=0.230; 95% CI=0.056-0.947).

Conclussion: The absence of reverse remodeling is associated with increased cardiac adverse events in middle-long term in patients undergone Cardiac Resynchronization Therapy.

CHRONIC ANXIETY IN ICD PATIENTS: A MULTI-CENTER STUDY

S. PEDERSEN[1], K. van den Broek[1], D. Theuns[2], R. Erdman[2], M. Alings[3], A. Meijer[4], L. Jordaens[2], J. Denollet[1]

[1] Tilburg University, CoRPS - Department of Medical Psychology, Tilburg, THE NETHERLANDS, [2] Erasmus Medical Center, Department of Cardiology, Rotterdam, THE NETHERLANDS, [3] Amphia Hospital, Department of Cardiology, Breda, THE NETHERLANDS, [4] Catharina Hospital, Department of Cardiology, Eindhoven, THE NETHERLANDS

Little is known about the prevalence of chronic anxiety in patients with an implantable cardioverter defibrillator (ICD). In a multi-center study, we examined 1) the prevalence of patients with chronic anxiety, and 2) the predictors of chronic anxiety at 12 months. ICD patients (N=222) recruited from three hospitals in the Netherlands, who were anxious at the time of implantation, comprised the sample for the current study. Patients completed the Type D Scale at baseline (assessing Type D personality, which is a risk marker of adverse health outcomes in cardiac patients, defined as the tendency to experience increased negative emotions paired with non-expression) and the State Trait Anxiety Inventory (state measure) at baseline and 12 months. Of all patients, 51.8% (115/222) who were anxious at the time of implantation were still anxious at 12 months follow-up. Diabetes (OR:4.57; 95% CI:1.65-12.66; p=.003) and Type D personality (OR:2.81; 95% CI:1.48-5.36; p=.002) were independent predictors of 12-month anxiety, adjusting for demographic and clinical variables including ICD therapy during follow-up. There was a trend for appropriate ICD therapy during follow-up (OR:1.94; 95% CI:0.86-4.37; p=.11), but it was not statistically significant. The prevalence of anxiety at 12 months in the 118 patients with no risk factors was 39.8%, whereas the prevalence was 65.4% in the 104 patients with either diabetes or Type D (p<.001). More than 50% of ICD patients anxious at the time of implantation were still anxious at 12 months, indicating a high level of chronicity. Diabetes and Type D personality were independent predictors of chronic anxiety. ICD patients anxious at the time of implantation should be closely monitored and offered adjunctive psychosocial intervention if symptoms do not remit spontaneously in order to prevent adverse health outcomes, as anxiety has been associated with poor prognosis and quality of life in patients with cardiovascular disease.

TRAJECTORIES OF ANXIETY AND DEPRESSIVE SYMPTOMS IN DUTCH PATIENTS WITH AN IMPLANTABLE DEFIBRILLATOR

K. VAN DEN BROEK[1], O. Smith[1], A. Meijer[2], M. Alings[3], J. Denollet[1], I. Nyklicek[1]

[1] Tilburg University - CoRPS - Department of Medical Psychology, Tilburg, THE NETHERLANDS, [2] Catharina Hospital - Department of Cardiology, Eindhoven, THE NETHERLANDS, [3] Amphia Hospital - Department of Cardiology, Breda, THE NETHERLANDS

Purpose: A subgroup of patients experiences anxiety and depressive symptoms following implantable cardioverter defibrillator (ICD) implantation, but little is known about the course of these symptoms. We examined 1) trajectories of anxiety and depressive symptoms in the first year post-implantation and 2) the predictors of these trajectories.

Materials and methods: ICD patients (N=312, 16.7% females, 62.8% ±60 years) completed the STAI (state-version) and BDI at baseline, and at 2 and 12 months post-implantation. Anxiety sensitivity (Anxiety Sensitivity Index), Type D personality (Type D Scale), and self-deception (Marlowe-Crowne scale) were also measured at baseline. SAS procedure TRAJ was used to examine trajectories over a 12-month period and multinomial logistic regression to examine predictors of these trajectories.

Results: Four distinct trajectories were found for both anxiety and depressive symptoms, that is respectively very low (8.0%), low (53.2%), mildly (35.3%), and severely (3.5%) anxious groups and parallel groups for depression (respectively, 38.1%, 36.9%, 17.0%, and 8.0%). Trajectories were relatively stable, although particularly within depression classes some statistically significant change was observed. Multinomial regression analyses showed that anxiety sensitivity (ORmildly anxious=3.76, p<.001) and Type D personality (ORmildly anxious=2.09, p=.03; ORseverely anxious=17.46, p=.001; ORseverely depressed=4.11, p=.005) were the most prominent predictors of anxiety and depression groups.

Conclusion: Anxiety and, to a lesser extent, depression trajectories tend to be stable in the first year post-implantation, with anxiety sensitivity and Type D personality being the most prominent predictors of these trajectories. Psychological screening may be implemented in hospitals to identify patients at risk for chronic anxiety and depression.

INCREASED ANXIETY AND DEPRESSION IN ICD PATIENTS WITH CLUSTERING OF LOW DEVICE ACCEPTANCE AND TYPE D PERSONALITY

S. PEDERSEN[1], H. Spindler[2], J. Johansen[3], P. Mortensen[3]

[1] Tilburg University, CoRPS - Department of Medical Psychology, Tilburg, THE NETHERLANDS, [2] Aarhus University, Department of Psychology, Aarhus, DENMARK, [3] Aarhus University Hospital, Department of Cardiology, Aarhus, DENMARK

Psychosocial risk factors tend to cluster together within individuals, likely enhancing the risk of adverse health outcomes. We examined the association between clustering of low device acceptance and Type D personality and anxiety and depressive symptoms in a large cohort of surviving implantable cardioverter defibrillator (ICD) patients implanted at a single center. Surviving patients (n=557; 81.9% male; mean age=61.9±14.3 years) having received an ICD between 1989-2006 at Aarhus University Hospital, Denmark, were asked to complete the Florida Patient Acceptance Survey (assessing device acceptance), the Type D Scale (assessing a risk marker of adverse health outcomes in cardiac patients, defined as the tendency to experience increased negative emotions paired with non-expression), and the Hospital Anxiety and Depression Scale. The prevalence of anxiety was significantly higher in patients with clustering of risk factors (54.2%) compared to patients with Type D personality only (26.5%), low device acceptance only (30.0%), or no risk factors (7.6%) p<.001). Similarly, the prevalence of depression was higher in the clustering group (47.2%) compared to patients with Type D personality only (23.5%), low device acceptance only (19.1%), or no risk factors (1.8%) (p<.001). Patients with the clustering of Type D and low device acceptance had the highest mean scores of anxiety (F(3,468)=36.847; p<.001) and depression (F(3,468)=55.533; p<.001), also when adjusting for demographic and clinical baseline characteristics including shocks. Shocks (p=.009) were associated with increased anxiety but not with depression (p=.26). Patients with clustering of poor device acceptance and Type D personality were at increased risk of anxiety

and depression. These patients should be identified and monitored in clinical practice, as they may benefit from psychosocial intervention in order to experience the same quality of life benefits following implantation as other patients. Given the cross-sectional nature of the study, these findings should be confirmed using a prospective study design.

INCREASED RISK OF VENTRICULAR ARRHYTHMIA IN IMPLANTABLE DEFIBRILLATOR PATIENTS WITH INCREASED ANXIETY AND A TYPE D PERSONALITY

K. VAN DEN BROEK[1], I. Nyklicek[1], P. Van der Voort[2], M. Alings[3], A. Meijer[2], J. Denollet[1]

[1] Tilburg University - CoRPS - Department of Medical Psychology, Tilburg, THE NETHERLANDS, [2] Catharina Hospital - Department of Cardiology, Eindhoven, THE NETHERLANDS, [3] Amphia Hospital - Department of Cardiology, Breda, THE NETHERLANDS

Purpose: Little is known about the role of psychological factors in the occurrence of life-threatening arrhythmias. We examined anxiety, depression, and Type D personality (tendency to experience increased negative emotions and to inhibit the expression of these emotions) as predictors of ventricular arrhythmias in implantable cardioverter defibrillator (ICD) patients.
Materials and methods: ICD patients (N=391, 81% males, age=62.3±10.4 years) completed questionnaires on anxiety (STAI), depressive symptoms (BDI), and Type D personality (DS14) at baseline (1 day-3 weeks post-implantation). The endpoint was occurrence of ventricular arrhythmias, defined as appropriate ICD therapies, in the first year post-implantation.
Results: Appropriate ICD therapies were experienced by 19% (n=75) of patients. Increased anxiety (OR=1.31; 95%CI 0.79-2.18; p=0.29) and depression (OR=1.04; 95%CI 0.62-1.76; p=0.89) did not predict arrhythmias, but there was a trend for Type D personality (OR=1.64; 95%CI 0.94-2.88; p=0.082). The combined presence of anxiety and Type D personality significantly predicted ventricular arrhythmias (OR=2.07; 95%CI 1.15-3.72; p=0.015). Stepwise logistic regression analysis confirmed that this interaction was significant; depressive symptoms did not have an incremental prognostic value. Adjusting for gender, age, ischemic etiology, left ventricular dysfunction, prolonged QRS duration, and no use of beta blockers and ACE inhibitors, the combined presence of anxiety and Type D personality (OR=1.92; 95% CI 1.04-3.52; p=0.036) as well as secondary prevention (OR=2.09; 95%CI 1.17-3.73; p=0.013) were independently associated with occurrence of ventricular arrhythmias.
Conclusions: Anxious Type D patients and secondary prevention patients are at increased risk to experience ventricular arrhythmias in the first year post-ICD implantation. Type D patients with increased anxiety post-implantation may be identified and offered support.

TRAUMATIC EXPERIENCE AND DISSOCIATION IN VASOVAGAL SYNCOPE

V. CARETTI[1], A. Schimmenti[2], G. Ducci[3], F. Monticelli[4], S. Banchetti[5], L. Bedeschi[5], A. Ciolfi[5], M. Lepore[5], E. Pietropaoli[5], A. Zangrilli[5], R. Ricci[6], M. Santini[6]

[1] Psychology Dpt, University Of Palermo, Palermo, ITALY, [2] Psychology Dpt, University Of Torino, Turin, ITALY, [3] Acute Psychiatric Ward, San Filippo Neri Hospital, Rome, Mental Health Dpt Roma E; Presam, Prevenzione E Salute Mentale, Rome, ITALY, [4] Acute Psychiatric Ward, San Filippo Neri Hospital, Rome, Mental Health Dpt Roma E, Rome, ITALY, [5] Presam, Prevenzione E Salute Mentale, Rome, ITALY, [6] Cardiovascular Dpt, San Filippo Neri Hospital, Rome, ITALY

Background: A strong correlation between vasovagal syncope and psychiatric symptoms such as anxiety, depression and somatoform disorders has been underlined.
Objectives This study means to reveal that some psychological traits, together with personal life story of those patients who are affected by vasovagal syncope, can fit the dissociative disorders diagnostic frame.
Methods: A 61 Tilt test patients sample, affected by vvs, has been assessed with: SCID D; SDQ 20, DES II (for psychological and somatoform dissociation); TSIA, TAS 20 (for emotional disregulation and alexithymia); CECA Q (measuring child mistreatment and abuse); ESS (measuring shame experiences).
Results: 14,3% of the assessed patients have satisfied the criteria for dissociative disorder diagnosis. The studies of the differences between groups show that patients who are positive to dissociation score highly in DES (t=2.01, DF=52, p<0.05), in SDQ 20 (t=2.63, DF=48, p<0.02), in CECA Q's maternal antipathy sub-scale (t=3.67, DF=46, p<0.,01), paternal neglect (t=2.38, DF=45, p<0.03), sexual abuse (t=2.16, DF=46 p<0.04) and severity of sexual abuse (t=2.62, DF=43, p<0.02). The correlation studies show several associations between the scales included in the research; the associations between DES and severity of sexual abuse are particularly significant (r=0.52 p<0.01), and also those between SDQ 20 and ESS (r=0.34, p<0.02); the most relevant associations concerning parents mistreatment, as measured by CECA Q, can be found in TAS 20 maternal mistreatment (r=0.59, p<0.01) and paternal mistreatment (r=0.55, p<0.01). Moreover, mistreatment by the mother is strongly associated with paternal mistreatment (r=0.66, p<0.01). Stepwise logistic regression studies with presence or absence of dissociative disorders as dependent variables has shown, among all the other variables, the predictive role of severity of sexual behaviours inflicted to the patients (Goodness of fit=93.8%, Nagelkerke R-squared=0.58, B=2.01, Wald=6.68, p<0.01). The linear stepwise regression itself, realized by having DES II as dependent variable, also shows the predictivity of sexual abuse, together with TAS 20's first factor and severity of physical abuse by the father (corrected r-square = 0.41, F3 57=14.67, p<0.01, B=0.85).
Conclusions: On the base of these outcomes, a significant presence of dissociative disorders can be underlined in this group, which is comparable with the prevalence of such disorder among psychiatric samples.

ELECTROPHYSIOLOGY LABORATORY NURSES'S ROLE IN THE MANAGEMENT OF ADULT'S CONSCIOUS SEDATION DURING ELECTROPHYSOLOGICAL PROCEDURES

F. MORANDI, D. Pecora, S. Predolini, A. Cipressa, S. Rozzini, M. Manziana, L. Presta, A. Zordan, C. Stamera, C. Cuccia

Fondazione Poliambulanza - Servizio di Elettrofisiologia, Brescia, ITALY

Previous experiences have demonstrated that conscious sedation (CS) is safe in adults during electrophysiological study (EPS) and radiofrequency ablation (RF) when the cardiologist is supported by the laboratory nurse (LN). The nurse's role is pivotal, beeing based on the continuous monitoring of life parameters (arterial blood pressure, heart rate, oxygen saturation) and on the continuous assessment of the sedation level. A specific monitoring of breathing parameters (especially pH and pressure of arterial carbon dioxide: PaCO2) is useful in order to avoid the side effects of benzodiazepines and opiates(B/O), which are represented by hypoxaemia, hypercapnia and necessity of hand bag ventilation and B/O antagonists infusion. From January 2008 to July 2008 40 patients (22 males, 18 females, average age 57 years) underwent EPS and RF. Treated arrhythmias were 26 atrioventricular nodal reentry tachycardias, 8 atrial flutters, 3 anomalous pathways (Kent type), 1 right atrial tachycardia and 2 Brugada syndromes. All patients underwent intermittent intravenous sedation with fixed doses of midazolam (3 mg) and fentanyl

(25 gamma) repetead at variable time intervals on the basis of the sedation level, assessed according to the Ramsay score, the arterial pressure and the blood artery parameters (Pa02, PaCO2, pH). The procedures' average duration was 85 minutes. The average fentanyl dose was 64 gamma, the average midazolam dose was 7 mg. All patients were acceptably sedated. Average pH was 7.39, average PaCO2 was 39 mmHg. No patient was treated either with hand bag ventilation or with administration of B/O antagonists.

Conclusions: continuous pH and PaCO2 monitoring performed by the LN, based on the regular taking of arterial blood samples, allows an adequate CS and minimizes the risk of breathing depression induced by B/O during electrophysiological procedures.

CONTINUOUS ECG MONITORING AFTER BALLOON CRYOABLATION OF THE PULMONARY VEINS IN THE PATIENTS WITH PAROXYSMAL AFIB

P. NEUZIL[1], V. Reddy[2], M. Táborský[1], J. Skoda[1], L. Sedivá[1], J. Petru[1], F. Holý[1], K. Holdová[1], J. Brada[1]

[1] *Na Homolce Hospital, Prague, CZECH REPUBLIC,*
[2] *University of Miami Hospital, Miami, USA,*

Background: The use of the cryoballoon for atrial fibrillation (AF) ablation has become increasingly prevalent due to its acute efficacy (electrical pulmonary venous disconnection) and decreased risk of PV stenosis and thromboembolism. However the long term effect still needs to be defined.
Methods: Before each ablation procedure subcutaneous monitor Reveal XT (Medtronic Inc.) was implanted and tested. Catheter ablation was performed using the cryoballoon catheter in 25 patients with paroxysmal AF with deflectable balloon catheter 23 and 28 mm (Arctic Front, CryoCath Inc.). The deflated balloon catheter was deployed through 12 Fr deflectable sheat. In the lef atrium balloon was inflated and positioned to each PV ostium. Each cryoablation application lasted 4 minutes and we put two more „bonus" lessions. Electrical PV isolation was controled by 20-pole circumferential catheter (Lasso, Biosense-Webster Inc) to verify both entrance and exit conduction block. Patients were followed up to 6 months after ablation procedure.
Results: Electrical isolation was achieved in all veins using catheter balloon only or in combination with „spot" cryothermia application (Freezor Max) in 3 veins. 14 patients were mapped again after two months and 43 from 49 PVs were still isolated (88%). This stable effect of electrical isolation corresponds with ECG recordings analysed from memory of subcutaneous monitor Reveal XT after 6 months follow up. We clearly documentated real AFib episodes only in two patients. In all other there were no AFib episodes or there were mainly artefacts.
Conclusion: Cryoballoon ablation can achieve electrical isolation at the level of PV ostia with excellent acute effect and with application of "bonus" lessions we proved with long term continuous ECG monitoring also stable chronic effect.

ASSESSMENT OF LONG-TERM EFFICACY OF TRANSCATHETER ABLATION OF ATRIAL FIBRILLATION BY MEANS OF PROLONGED AMBULATORY ECG MONITORING

A. GARGIULO, M. Madalosso, F. Giada, A. Bonso, A. Rossillo, S. Themistoclakis, A. Raviele

Cardiovascular Department, Umberto I Hospital, Mestre-Venice, ITALY

Background: The possibility of asymptomatic paroxysmal atrial arrhythmias makes it difficult to establish the real success of pulmonary veins isolation (PVI) in the treatment of atrial fibrillation (AF). The aim of this study was to investigate, in patients (pts) submitted to clinically effective PVI, any asymptomatic atrial arrhythmias during long-term follow-up.
Methods: We evaluated 126 consecutive pts (age 52 ± 12 years, 95 males) affected by symptomatic, drug-refractory AF (32% paroxysmal, 44% persistent, 24% permanent), who underwent transcatheter PVI guided by intracardiac echocardiography, and with a post-ablation follow-up > 24 months. Pts with PVI considered clinically effective ¨C i.e. no sustained (≥ 1 minute) AF or atrial flutter/tachycardia (AT) during 12-lead ECG, 24-h Holter and event recorder monitoring at 3°, 6°, 12°, 18° and 24° months, and no antiarrhythmic drug therapy - were studied by means of a 7 days Holter monitoring.
Results: A structural heart disease was present in 73 (62%) pts (34 hypertensive, 28 valvular, 5 hypertrophic, 2 dilated, 2 arrhythmogenic, 2 ischemic), with a mean left atrial diameter of 45 ± 9 mm. The mean post-ablation follow-up was 42 ± 8 months. PVI was clinically effective in 71 (56%) pts, 56 of whom agreed to participate in the study. Sustained atrial arrhythmias (1 episode of asymptomatic AT of 4 minutes duration) were detected only in 1(2%) pt; non-sustained atrial arrhythmias (38 AT, 3 AF) were recorded in 41 (73%) pts, with the longer episode of 34 seconds. Runs of non-sustained ventricular tachycardia were recorded in 13 (23%) pts.
Conclusions: During long-term follow-up after clinically effective PVI, sustained asymptomatic atrial arrhythmias seem to be quite rare, even in pts with persistent/permanent AF, and significant structural heart disease. In these subjects, therefore, the withdrawal of oral anticoagulant therapy could be considered.

RADIOFREQUENCY ABLATION OF ATRIAL FIBRILLATION IN PATIENTS WITH PATENT FORAMEN OVALE

A. ARDASHEV, E. Zhelyakov, A. Shavarov, M. Rybachenko

Burdenko Head clinical hospital, Moscow, RUSSIA

Purpose: to evaluate efficiency of radiofrequency ablation (RFA) of atrial fibrillation (AFib) in patients (pts) with patent foramen ovale.
Material and methods: From 1999 to 2007 we performed 240 RFA of AFib using LASSO-technique and CARTO electroanatomic mapping. Study was conducted on 50 consecutive pts (13 women, 50.6±6.7 years of age) with the paroxysmal (48%), persistent (33%) and chronic (25%) AFib underwent circumferential RFA guided by CARTO system. Patent foramen ovale was verified in 25 pts (6 women) using transesophageal and/or intracardiac echocardiography. Control group included 25 pts (7 women) without patent foramen ovale. Both groups were comparable to arrhythmia time course, sex and age. TTE parameters, quality of life measurements before RFA, 2 months, 6 months and year after RFA were analyzed.
Results: Follow-up was 8.2±3.1 mos. "First month arrhythmias" manifested in 10 (40%) patent foramen ovale pts vs. 7 (28%) pts of control group after primary RF-ablation session (ð<0.05). Electrical and/or drug cardioversion were effective in all cases in study group. Effective re-do RFA was performed in 4 pts of control group with sustained drug-refractory AAF (3 pts) and focal left atrial tachycardia (1 pt).
Conclusion: Patent foramen ovale associated with higher incidence of "first month arrhythmias" after RFA of AFib.

IMPROVEMENT OF MORPHOLOGICAL AND FUNCTIONAL CARDIAC PARAMETERS AFTER CATHETER ABLATION OF LONGSTANDING PERSISTENT ATRIAL FIBRILLATION

M. FIALA, L. Sknouril, M. Dorda, J. Gorzolka, V. Bulkova, J. Chovancik, R. Nevralova, O. Jiravsky, B. Jiravska-Godula, J. Januska, M. Branny

Hospital Podlesi, Department of Cardiology, Trinec, CZECH REPUBLIC

Aims: Morphological and functional parameters prior to and after single complex left atrial (LA) ablation for longstanding persistent atrial fibrillation (AF) were compared.
Methods: Fifty patients (pts) (58±10 years) were examined prior to and 6 months after catheter ablation for longstanding persistent AF (persistent AF >12 months, resistant amiodarone and cardioversion). The ablation endpoints were full pulmonary vein isolation, sinus rhythm (SR) restoration by ablation (successful in 23 pts), and preservation of early LA appendage (LAA) activation. Echocardiography and spiroergometry parameters, and NTproBNP were compared.
Results: At 6 months, 32 (64%) were in SR. LA long and short axes (mm) in 4-chamber apical view decreased from 68±8 to 62±62, and from 47±6 to 44±6 (both P<0.001). Right atrial long and short axes also shortened significantly. LAA flow velocity (cm/s) improved from 41±22 to 52±25 (P=0.01), resp. from 47±21 to 60±2 (P=0.02) in pts with SR. Left ventricular ejection fraction (%) increased from 54±10 to 56±7 (P=0.08), resp. from 54±11 to 58±5 (P=0.05) in pts with SR. Pulse volume (ml) increased from 58±18 to 71±19, resp. from 58±18 to 78±16 in pts with SR (both P<0.001). Maximum oxygen consumption (ml/kg/min) improved from 20±5.7 to 21.1±7 (P=0.2), and from 20.5±5.1 to 22.4±6.3 (P=0.1) in pts with SR. NTproBNP (pg/ml) decreased from 1110±812 to 552±734, resp. from 1118±696 to 289±241 in pts with SR (P<0.001).
Conclusion: Complex LA ablation of longstanding persistent AF led to medium-term significant improvement of morphological and functional cardiac parameters, suggesting possible preventive effect against thromboembolic events and development of left ventricular dysfunction.
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ATRIAL ABLATION FOR ATRIAL FIBRILLATION IN PATIENTS WITH CONGESTIVE HEART FAILURE: DIFFERENCES BETWEEN PAROXYSMAL AND PERMANENT ATRIAL FIBRILLATION

L. DI BIASE[1], M. Khan[2], A. Raviele[3], S. Themistoklakis[3], A. Bonso[3], A. Rossillo[3], A. Corrado[3], P. Jais[4], R. Horton[5], R. Fanelli[5], D. Potenza[5], A. Dello Russo[6], G. Pelargonio[6], P. Santarelli[6], S. Hao[7], J. Sanchez[9], P. Wang[8], S. Beheiry[7], M. Haiissaguerre[4], A. Natale[9]

[1] Texas Cardiac Arrhythmia Institute, University of Texas at St. Davids Hospital, University of Foggia, Foggia, Italy, Austin, USA, [2] Chiacago Associates, Chicago, USA, [3] Hospital Umberto I, Mestre, ITALY, [4] Hospital Cardiologique du Haut-Leveque, BORDEAUX, FRANCE, [5] Casa della Divina Provvidenza, San Giovanni Rotondo, ITALY, [6] Catholic University, Rome, ITALY, [7] Sutter Pacific Hospital, San Francisco, USA, [8] Stanford University, Palo Alto, USA, [9] Texas Cardiac Arrhythmia Institute, Austin, USA

Introduction: Catheter ablation is increasingly being used for the treatment of patients with congestive heart failure and atrial fibrillation (AF).
Whether there is a difference in terms of clinical, functional and morphological improvement between patients with paroxysmal and non paroxysmal atrial fibrillation need further investigation.
Methods: 81 consecutive patients with symptomatic, drug-resistant atrial fibrillation (40 paroxysmal and 41 non paroxysmal), EF <40% and NYHA II-III and successful ablation were enrolled in a prospective, multi-center registry.
All patients underwent isolation of the posterior wall and defragmentation if they had non paroxysmal AF. All patients underwent Minnesota Living with Heart Failure (MLWHF) questionnaire, echocardiogram (EF) and in 50% of them 6-minute walk test.
After a mean follow-up of 12±6 months during which freedom from both symptomatic and asymptomatic episodes of atrial fibrillation was documented with event recorder and prolonged Holter Monitoring, the following results were observed.
Results: EF improvement was greater in the non paroxysmal patients 13±9% when compared to the paroxysmal ones 4±2% (p<0.001). A similar result was shown for the 6-minute walking distance test (98±62m vs 42±21m, p<0.001), the Minnesota test scores (33±14 vs 24±8 p=0.0013) and for the left atrial sizes (0.6±03cm vs 0.2±0.2 cm, p<0.0001).
Conclusion: Cure of atrial fibrillation by catheter ablation in patients with heart failure, shows the most remarkable improvements in the subgroup of patients with non paroxysmal AF.

PULMONARY VEIN ISOLATION BY TC SCAN IMAGING INTEGRATION SYSTEM, IN PATIENTS WITH ATRIAL FIBRILLATION RELAPSE AFTER THE FIRST PROCEDURE

A. Colella[1], C. VANNINI[2], M. Giaccardi[3], M. Bartolini[2], I. Menchi[2], G.F. Gensini[1]

[1] Dept. Heart and Vessels-AOU Careggi., Firenze, ITALY, [2] Radiology Dept.-AOU Careggi, Firenze, ITALY, [3] Dept. Cardiovascular Rehabilitation, Don Gnocchi Foundation, Firenze, ITALY

Background: The use of integrated electroanatomic mapping with preacquired computed tomographic (CT) images to guide catheter ablation of atrial fibrillation (AF), are highly desirable to maximize the efficacy and minimize the risks of AF ablation procedures. The purpose of this study was to assess the short-term success rates of PV isolation in patients with AF relapse after the first catheter ablation, using a TC scan integration system (CARTO MERGE).
Methods: A total of 16 patients (5 female), mean age 58±11 years, with symptomatic paroxysmal AF were enrolled. In all patients the left atrium maps were constructed with CARTO MERGE on a preacquired 64-slice TC scan (LightSpeed VCT® GE). To achieve complete PV isolation, radiofrequency energy (30-50 Watt) was applied around all PV ostium.
Results: A typical 4-PV pattern was present only in 7 patients (48%). The presence of a short and long left common trunk was observed in three patients (19%) and two patients (13%), respectively. A right accessory PV was observed in four patient (25 %) {3 intermediate trunk (19%) and 1 superior trunk (6%)}. A linear correlation was showed between the TC scan and the CARTO MERGE measures (r^2=0.9605). After 3 months of follow-up, with the TC scan guided procedure, Twelve of 16 (75%) patients were free of AF without antiarrhythmic drugs, with a significant improve of success rate after the first procedure only with electroanatomic mapping system {5/16 pts (31%), p<0.05}.
Conclusion: The use of registered CT images to guide catheter ablation presents a significant advantage over the less-detailed surrogate geometry created by previously available 3D mapping systems. Three dimensional CT images can be successfully extracted and registered to anatomically guided clinical AF ablations. The display of detailed and accurate anatomic information during the procedure enables tailored RF ablation to individual PV and LA anatomy.

Cardiac Resynchronization Therapy: how to Pre Identify Responders

EFFICACY OF LOW-DOSE DOBUTAMINE STRESS ECHOCARDIOGRAPHY TO PREDICT CARDIAC RESYNCHRONIZATION THERAPY RESPONSE (LODO-CRT) TRIAL - DESIGN AND RATIONALE

C. DICANDIA[1], S. Iacopino[2], M. Gasparini[3], F. Zanon[4], A. Curnis[5], V. Calvi[6], P. Diotallevi[7], C. Peraldo[8], M. Davinelli[9], S. Valsecchi[9], C. Muto[10]

[1] Città di Lecce Clinic, Lecce, ITALY, [2] Sant'Anna Clinic, Catanzaro, ITALY, [3] Humanitas Clinical Institute, Rozzano, ITALY, [4] Santa Maria della Misericordia Hospital, Rovigo, ITALY, [5] Spedali Civili, Brescia, ITALY, [6] V. Emanuele Ferrarotto S. Bambino University Hospital, Catania, ITALY, [7] Santi Antonio e Biagio e Cesare Arrigo Hospital, Alessandria, ITALY, [8] Fatebenefratellil - San Giovanni Calibita Hospital, Rome, ITALY, [9] Medtronic Italy - Clinical Department, Rome, ITALY, [10] Santa Maria di Loreto Mare Hosptial, Naples, ITALY

Purpose: While cardiac resynchronization therapy (CRT) has a well demonstrated therapeutic effect in selected patients with advanced heart failure (HF) on optimized drug therapy, non-responder rate remains high. The low-dose dobutamine stress-echo (DSE) test to predict positive response to CRT (LODO-CRT) is designed to improve patient selection for CRT. Design and rationale of this study are presented herein.

Methods and results: LODO-CRT is a multicenter study enrolling (started in late 2006) HF patients with conventional indication to CRT (symptomatic stable NYHA class III-IV on optimized drug therapy, QRS≥120 ms, left ventricular (LV) dilatation, LVEF≥35%) and is designed to assess the predictive value of LV contractile reserve (LVCR), determined through DSE, in predicting CRT response during follow-up. Assessment of CRT effects will follow two sequential phases: in phase 1 CRT response end-point is defined as left ventricular end-systolic volume (LVESV) reduction ≥10% at 6 months; in phase 2, both LVESV reduction and clinical status via a clinical composite score will be evaluated at 12 months follow-up. Predictive value of LVCR will be compared to other measures, such as LV dyssynchrony measures, through adjusted multivariable analysis. For the purpose of the study, target patient number is 270 patients (with 95% confidence, 80% power, ¦ Á≥0.05). Results of Phase 1 evaluation will be available in early 2009.

Conclusion: LVCR assessment, using low-dose DES test, should effectively predict positive response to CRT both in terms of the reverse remodeling process as well as favourable long-term clinical outcome. Moreover, the predictive value of LVCR will be compared to that of conventional intra-LV dyssynchrony measures.

PREVALENCE OF MYOCARDIAL CONTRACTILE RESERVE IN A POPULATION OF PATIENTS SELECTED FOR CARDIAC RESYNCHRONIZATION THERAPY

S. IACOPINO[1], M. Gasparini[2], F. Zanon[3], C. Dicandia[4], A. Curnis[5], P. Diotallevi[6], V. Calvi[7], A. Cesario[8], M. Davinelli[9], S. Canonaco[9], C. Muto

[1] Sant'Anna Clinic, Catanzaro, ITALY, [2] Humanitas Clinical Institute, Rozzano, ITALY, [3] Santa Maria della Misericordia Hospital, Rovigo, ITALY, [4] Città di Lecce Clinic, Lecce, ITALY, [5] Spedali Civili, Brescia, ITALY, [6] Santi Antonio e Biagio e Cesare Arrigo Hospital, Alessandria, ITALY, [7] V. Emanuele Ferrarotto S. Bambino University Hospital, Catania, ITALY, [8] G.B. Grassi Hospital, Ostia, ITALY, [9] Medtronic Italy, Rome, ITALY, [10] Santa Maria di Loreto Mare Hospital, Naples, ITALY

Introduction: Cardiac resynchronization therapy (CRT) is a proven effective treatment in selected patients with advanced heart failure (HF). Nevertheless, non-responder rate remains high. Early findings suggest that the presence of Left Ventricular Contractile Reserve (LVCR) predicts positive response to Cardiac Resynchronization Therapy (CRT). Low-dose Dobutamine Stress-Echo (DSE) test is able to highlight the presence of CR in ischemic and non-ischemic HF patients. In the framework of the LODO-CRT trial, designed to investigate the association between contractile reserve and response to CRT, we evaluated the presence of LVCR in a population of CRT candidates and its association to other clinical and echocardiographic parameters.

Methods: 294 CRT patients underwent a Low-dose DSE test (<20ìg/Kg/min) prior device implantation. The presence of LVCR was assessed by estimating Left Ventricular Ejection Fraction (LVEF) at rest and at peak stress conditions. Response to the test was considered as positive if LVEF increase during stress conditions was >5 points.

Results: Test was interrupted in 11 patients due to ventricular arrhythmias onset and in 2 patients due high blood pressure, without any clinical consequences. 205/281 (73%) patients positively responded to DSE-test. Analysing other clinical and echocardiographic baseline parameters we found no significant differences between responders and non-responders to stress echocardiography test.

Conclusion: In this experience DSE test was found to be highly feasible (96% of a population of CRT candidates) without adverse events. In a 'real-life' population, almost 3 out of 4 patients showed presence of LVCR. Moreover, no other pre-implant parameter was able to differentiate the responders to DSE test from non-responders. Data on the association between LVCR and CRT response are expected in a few months for this population: should the correlation be confirmed, DSE test will represent an easy and valuable elective test for the selection of CRT candidates.

MYOCARDIAL CONTRACTILE RESERVE AT DOBUTAMINE STRESS ECHOCARDIOGRAPHY AND LEFT VENTRICULAR DYSSYNCHRONY IN CRT RECIPIENTS

R. DONATI[1], R. Alemanni[2], R. Bragato[3], V. Marangelli[4], S. Scandura[5], G. Giarratana[6], M. Liccese[7], L. Lombardo[8], M. Davinelli[9], G. Rosatella[9], C. Peraldo[10]

[1] G. B. Grassi Hospital, Rome, ITALY, [2] Sant'Anna Clinic, Catanzaro, ITALY, [3] Humanitas Clinical Institute, Rozzano, ITALY, [4] University Hospital, Bari, ITALY, [5] V. Emanuele Ferrarotto S. Bambino University Hospital, Catania, ITALY, [6] G. Giglio Hospital, Cefalù, ITALY, [7] Anthea Clinic, Bari, ITALY, [8] San Vincenzo Hospital, Taormina, ITALY, [9] Medtronic Italy, Rome, ITALY, [10] Fatebenefratelli - San Giovanni Calibita Hospital, Rome, ITALY

Purpose: Several studies have been published claiming the effectiveness of left ventricular (LV) dyssynchrony assessment, by means of Tissue Doppler Imaging (TDI), in predicting the response to cardiac resynchronization therapy (CRT). A recent large trial, however, raised substantial issues on the feasibility and reliability of such technique. On the contrary, some early experiences suggest that the presence of LV Contractile Reserve (LVCR) is able to predict positive response to CRT. Aim of this study was then to evaluate, in a population of CRT candidates, the concomitant presence of LV-dyssynchrony and LVCR and to investigate whether an association could be found between the two parameters.

Methods: A group of 126 patients was studied with pulsed-wave TDI technique to assess LV-dyssynchrony. LV-dyssynchrony was defined as the maximum difference between any two of the activation delays measured for six basal LV segments. Moreover, all the patients underwent a Dobutamine Stress Echocardiography (DSE) test

to evaluate the presence of LVCR (maximum infusion rate: 20µg/kg/min). Response to the DSE-test was considered as positive if ejection fraction increase during stress conditions was >5 points.
Results: DSE-test could be accomplished in 121(96%) patients, while a complete set of TDI data could be collected in 123 (98%) patients. The results of both tests were available for 118(94%) patients. 83(70%) of those patients showed presence of LVCR. Average LV-dyssynchrony didn't show any difference between responders and non-responders to DSE-test (69±43ms versus 76±40ms, p=0.4). Furthermore, we didn't observe a significant correlation between the extent of LV-dyssynchrony and the increase in ejection fraction during DSE-test.
Conclusion: In this experience we found no association between LV-dyssynchrony and presence of LVCR in patients selected for CRT. This suggests that the presence of vital myocardium, lately considered as a strong predictor of positive response to CRT, is not directly inferrable from LV-dyssynchrony measures.

LEFT VENTRICULAR DYSSYNCHRONY DURING DOBUTAMINE STRESS ECHOCARDIOGRAPHY: NEW TOOLS FOR PREDICTING CRT RESPONSE

F. ZANON[1], S. Aggio[1], E. Baracca[1], F. Pastore[1], D. Vaccari[2], R. Verlato[2], M. Davinelli[3], G. Imbimbo[3]

[1] Santa Maria della Misericordia Hospital, Rovigo, ITALY, [2] Civil Hospital, Montebelluna (TV), ITALY, [3] Civil Hospital, Camposampiero (PD), ITALY, [4] Medtronic Clinical Department, Rome, ITALY, [5] Medtonic Cardiac Rhythm Disease Management Department, Milan, ITALY

Purpose: Left ventricular (LV) dyssynchrony assessment using Tissue Doppler Imaging (TDI) has been claimed to be a key factor in predicting response to cardiac resynchronization therapy (CRT). In the vast majority of cases, dyssynchrony assessment is performed at rest. Our hypothesis is that concomitant assessment of inotropic contractile reserve (CR) and LV dyssynchrony allows estimating the theoretical effect of cardiac resynchronization.
Methods: 38 CRT candidates underwent color TDI to assess dyssynchrony during a Dobutamine Stress Echocardiography (DSE) test for detecting CR (maximum infusion rate: 20 µg/kg/min). Response to test was positive if LV ejection fraction (LVEF) increase during stress was >5 points. LV dyssynchrony during DSE was assessed using the method of Yu, which calculates the delay as the standard deviation of the activation delays measured for 12 LV segments. The Yu index was evaluated at rest and at peak stress.
Estimated intra-observer variability for the Yu index was 4.87%. The measured indexes were combined into a predictive model for the estimation of the theoretical effect of the CRT in terms of LVEF improvement.
Results: DSE test could be accomplished in 36 patients (95%), while a complete set of TDI data could be collected in all studied patients. 26 patients (71%) patients showed CR.
Yu index decreased significantly during stress (48 ms vs 40 ms, p=0.003). Similarly, the average delay at stress was significantly lower than at rest (201 ms vs 160 ms, p<0.001).
15 patients have been already re-evaluated after six months of CRT; an R=0.96 has been observed between measured LVEF at six months and estimated LVEF at baseline.
Conclusion: In candidates to CRT, a predictive model based on the combined evaluation of intra-LV dyssynchrony and LVEF during inotropic stress conditions may represent an effective tool to predict the theroretical response in terms of LVEF improvement after six months of CRT.

IS INTRA-THORACIC IMPEDANCE CORRELATED WITH NT-PROBNP PLASMA CONCENTRATIONS, ECHO DOPPLER TRANS-MITRAL FLOW AND CLINICAL STATUS IN HEART FAILURE PATIENTS?

G. ZANOTTO[1], L. Tomasi[1], R. Ometto[2], C. Bonanno[2], M. Maines[3], G. Vergara[3], G. Lonardi[4], E. Visentin[4], W. Rauhe[5], C. Perrone[6], E. Caliari[7], T. De Santo[7], A. Varbaro[7]

[1] Borgo Trento, Verona, ITALY, [2] S. Bortolo, Vicenza, ITALY, [3] S. Maria del Carmine, Rovereto, ITALY, [4] Mater Salutis, Legnago, ITALY, [5] S. Maurizio, Bolzano, ITALY, [6] ULSS5, Arzignano (VI), ITALY, [7] Medtronic Italia, Sesto S. Giovanni (MI), ITALY

Introduction: Increased plasma levels of NT-proBNP and abnormalities of diastolic filling are clinical markers of deteriorated chronic heart failure (CHF). Currently, some implantable devices are able to monitor intra-thoracic impedance and to early alert patients in case of deterioration in CHF.
Aim of our analysis was to assess the correlation between this latter parameter and both NT-proBNP plasma concentration and echo Doppler trans-mitral flow indexes.
Methods: At baseline, at bimonthly regular follow-up and at unscheduled visit for CHF decompensation or device alerts, device diagnostics and clinical status were collected from 111 CHF patients implanted with a CRT-D device (InSync Sentry, Medtronic) (85% male, 68±10 years, LVEF=26±5%) from 6 Italian centers. Intra-thoracic impedance, NT-proBNP plasma concentration, E wave deceleration time (DtE) at echo Doppler and clinical status were reported. We defined Confirmed alert (CA) as alert-generated follow-ups with clinical evidence of CHF deterioration and Confirmed Non-alert (C-NA) as scheduled follow-ups without CHF decompensation.
Results: Over a mean follow-up of 12.4±3.6 months, 955 visits were performed, 186 because of device alert. Among them 111 cases were CA with an increment in diuretic dosage, 20 cases were associated to other clinically relevant events (bronchitis, pneumonia, pocket edema). A rate of 0.47 alerts per patient/year remained unexplained. 727 scheduled follow-ups were C-NA. Intra-thoracic impedance resulted significantly correlated with NT-proBNP (p=0.013) and with DtE (p=0.017) but in a multivariate model it was independently correlated only with DtE (p=0.047). Moreover, during CA, NT-proBNP was significantly higher than during C-NA (1949 [598-3636] pg/dL versus 1851 [645-3036] pg/dL; p=0.033).
Conclusions: A decrease in intra-thoracic impedance is significantly associated with clinical markers of deteriorated CHF. These data suggest that intra-thoracic impedance monitoring and alert has the physiological bases for being a useful tool for the outpatient management of CHF patients with implanted CRT devices.

EVALUATION OF LEFT VENTRICULAR DYSSYNCHRONY IN ISCHEMIC VERSUS NON-ISCHEMIC CRT PATIENTS

C. PERALDO[1], S. Matera[1], M. Ruzzolini[1], F. Mirabelli[1], F. Sgreccia[1], M. Davinelli[2], S. Valsecchi[2], P. Azzolini[1]

[1] Ospedale Fatebenefratelli - San Giovanni Calibita, Rome, ITALY, [2] Medtronic Italia, Rome, ITALY

Purpose: Cardiac Resynchronization Therapy (CRT) has shown to improve symptoms and prognosis of patients affected by moderate to severe heart failure with documented evidence of ventricular mechanical dyssynchrony and prolonged QRS complex duration. We provided a description of intraventricular dyssynchrony in CRT

patients stratified by aetiology, assessing the dyssynchrony status 6 and 12 months after device implantation.

Methods: Tissue Doppler Imaging was performed in 40 consecutive CRT candidates (21 ischemic, 19 non-ischemic) at baseline, 6-month and 12-month follow-up. An 11 healthy subjects group was considered for comparison.

Results: At baseline the standard deviation and the maximum activation delay between any 2 segments were significantly greater in ischemic (38±b33ms, 94±b76ms) and non-ischemic (38±b24ms, 96±b62ms) patients versus controls (9±b7ms, 22±b15ms) (all $p<0.05$). Activation delay vectors, reflecting primary orientation of delay, showed more variability for ischemic than for non-ischemic patients. At 6-month follow-up, standard deviation and maximum delay did not vary in non-ischemic while decreased in ischemic group. Primary vectors orientation in ischemic patients was towards the lateral wall, as in many non-ischemic. In some non-ischemic patients the inferior-septum became the last activated region. All modifications persisted at 12-month.

Conclusion: No differences were observed between ischemic and non-ischemic patients using echo-based numerical indices. A geometrical representation of ventricular activation pattern was able to depict higher variability in delayed segments localization in ischemic patients. At 6-month follow-up we observed significant modification of ventricular activation pattern, confirmed at 12-month.

SIGNIFICANCE OF PRIMARY VENTRICULAR FIBRILLATION IN ST-ELEVATION MYOCARDIAL INFARCTION PATIENTS TREATED BY PRIMARY CORONARY INTERVENTION

D. PETRAC, V. Nikolic Heitzler, Z. Babic, M. Pavlov, V. Radeljic, D. Delic Brkljacic, S. Manola, N. Bulj

Sestre Milosrdnice University Hospital, Zagreb, CROATIA

Aim: Although coronary reperfusion by primary coronary intervention (PCI) assures better survival for the patients with ST elevation myocardial infarction (STEMI), the impact of primary ventricular fibrillation (VF) on prognosis in such patients is not well elucidated. Therefore, the aim of this study was to assess wither primary VF portends a poor prognosis in these patients.
Methods: Occurrence of primary VF and its effect on clinical outcomes were prospectively evaluated in 450 consecutive patients with STEMI in whom the PCI was performed <12 hours form the onset of pain. The primary end-points were intra-hospital mortality and mortality after 1-year follow-up.
Results: From total of 450 patients, 29 (6.4%) suffered VF within the first 48 hours from the onset of STEMI. In 4, 13 and 12 patients VF occurred prior, during and after PCI, respectively. Patients with VF (n=29) and patients with no VF (n=421) did not differ according to age, gender, risk factors, STEMI localization, time from the onset of pain and duration of PCI. Patient with VF had less often complete reperfusion and underwent less often stent implantations. Intrahospital mortality was higher in patients with VF than in those with no VF (31% vs 5.9%, p<0.005).
During the 1-year follow-up no significant differences were found regarding to major adverse cardiovascular events (MACE) and 1-year mortality (5.0% vs 9.4%). A VF group analysis was made regarding to the timing of VF. Patients who suffered VF during the PCI showed a trend towards lower intra-hospital mortality rates than those who suffered VF after PCI.
Conclusion: Primary VF is a strong predictor of intra-hospital mortality in patients with STEMI treated by primary PCI, but does not influence 1-year mortality and the rate of MACE. It seems that VF during the primary PCI has better prognosis than that occuring after PCI.

EFFICACY OF PUBLIC ACCESS DEFIBRILLATION IN SELECTED CONFINED LOCATIONS: THE TRIDENTE VITA PROJECT OF ROME - RAILWAY STATIONS

F. BISCIONE, F. Messina, A. Cautilli, A. Totteri, G. Altamura

Cardiologia-UTIC, Ospedale S. Giacomo, Roma, ITALY

The appropriate selection of the locations seems to be crucial for the success of Public Access Defibrillation Programs (PAD). The TRIDENTE VITA project has been started in 2003 in Rome, aiming to reduce the mortality of cardiac arrest in the central locations of the city.
40 semi-automated defibrillators have been deployed: 24 in movable positions (vehicles) and 18 in fixed positions: 6 out of 18 were deployed in the main railway stations.
Results: 23 interventions occurred, with 21 documented CA (16 males, mean age 63 y). The presentation rhythm was ventricular fibrillation (VF) in 16 pts (76%), asystole in 4 and pulseless electrical activity (PEA) in 1. The mean call-to-shock time was 4.5±1.0 min. (range 2-7,5). 12/21 pts were assisted with cardio-pulmonary resuscitation before the shock. 14/21 pts were admitted alive to the hospital, and 8/21 were discharged alive (38% of CA). 2 pts presented a persistent neurological impairment.
16 episodes of CA occurred in the railway stations, where the mean intervention time was 4.1 min. 14/16 subjects were found in VF (88%).
12/14 of the pts admitted to hospital and 7/8 of those discharged alive had their CA episode in a railway stations, that seems to be a favourable scenario for an efficient intervention of Public Access Defibrillation.
Cost-effective analysis: the total costs of our project reaches 275,150 €, that is 34,300 € per life saved, and 26,000 per life-year saved, considered attractive.
Conclusions: the interventions were rapid and highly effective, with a promising total survival rate.
The post-hoc analysis suggest that a careful identification of the site to be protected (i.e. railway stations or similar) can improve the efficacy and cost-effectiveness of the PAD projects.

PREVENTING SUDDEN CARDIAC DEATH WITH ICD'S. WHICH PATIENTS HAVE HIGHER RISK?

L. PAPAVASILEIOU, L. Santini, G.B. Forleo, A. Panella, G. Magliano, K. Bellos, M. Borzi, F. Romeo

Cardiology Department, University Of Rome, Tor Vergata, Rome, ITALY

ICD's are usually implanted as primary or secondary prevention in patients at risk for SCD due to various clinical conditions.
Methods: We evaluated 1 year's follow up of 171 pts with ICD. 59% were affected by ischemic heart disease (group A) and 40,9% by other heart disease (group B). Group A: mean age was 69,23±10,5 yrs, mean LVEF 24.9±7.8 %. 54 single chamber ICD (SC ICD), 24 dual chamber ICD (DC ICD) and 23 CRT. Group B 49 pts were affected by idiopathic dilated cardiomyopathy, 4 by hypertrophic cardiomyopathy, 5 by Brugada syndrome, 8 resuscitated cardiac arrest, 1 by arrhythmogenic right ventricular cardiomyopathy, 1 by catecholaminergic polymorphic ventricular tachycardia and 2 by long QT syndrome. Mean age was 61,75±14,5 yrs, mean LVEF 32,5±16%. 40 SC ICD, 14 DC ICD and 16 CRT.
Results: Group A 13 pts were lost at follow-up and 9 in group B. Group A: 32.9% episodes of AF, 59% non-sustained VT, 32.9% sustained VT, 21,5% received ATP and 22.7% DC shock. 7,9% cases of malfunction, 4.5% infections, 7.9% inappropriate shocks. Group B: 31% episodes of AF, 54% non-sustained VT, 21.3% sustained VT, 18% received ATP and 13.1% DC shock. 4.9% cases of malfunction, 3.2% infections,1.6% inappropriate shocks. Statistical analysis showed that only inappropriate shocks were statistically significant. Statistical analysis of pts with CRT vs. pts with SC or DC ICD only the episodes of non sustained VT resulted to be statistically important. Total cases of infections were 6/149, of malfunction 10/149 and inappropriate shocks 8/149.
Conclusions: Patients with ICD suffer frequently by non-sustained and sustained VT's. The primary cause of implant of ICD, in our study, does not result to be statistically significant. Every year, 20% of patients receive treatment by the ICD. Rate of infections, malfunction or inappropriate shocks is low.

PREDICTORS OF LEFT VENTRICULAR FUNCTIONAL RECOVERY IN PATIENTS WITH NEW ONSET HEART FAILURE UNDERGOING OPTIMAL THERAPY

R. ROMAGUERA[1], A. Quesada[1], A. Laynez[1], J. Estornell[2], J.L. Perez-Bosca[1], R. Paya[1], A. Valle[1], M. Corbi[1], A. Pirola[1], C. Rodriguez[1], F. Ridocci[1]

[1] Hospital General Universitario de Valencia, Valencia, SPAIN, [2] ERESA, Valencia, SPAIN

Background: A significant number of patients with acute heart failure (AHF) due to severe left ventricular (LV) dysfunction may have a "benign" temporal course outcome with marked improvement in LV function during follow-up. However, predictors of such a recovery are not well known and understood.
Objective: We evaluated the feasibility of using late gadolinium enhancement cardiovascular magnetic resonance (LGE-CMR) to predict the improvement in LVF in new onset heart failure (AHF) patients on optimized medical therapy, developing a logistic regression predictive model. Additionally, the change in ICD implant criteria rate after 8 months on optimal medical therapy (6m-OMT). was selected as an secondary objective.
Methods: We studied 90 patients admitted with AHF and EF <35% underwent LGE-CMR. Baseline and 8 m follow-up echocardiography was used to assess functional recovery and demographic and clinical variables were recorded. We evaluated change in the proportion of patients who satisfied criteria for device implantation (EF<35%) after 8 month on optimal therapy.
Results: During follow-up 80% were treated with α-Blockers and 90% with ACE inhibitors or ARB. 8 months mean EF increased 13.4 points (CI 95%, 10.5-16.4), yielding a 56.7% of the patients did not meet criteria for ICD implant. No arrhythmic deaths occurred. Multivariate analysis showed that LGE-CMR (OR 0.10, CI 0.02–0.48, p =0.004), left bundle branch block (OR 0.14 CI 0.03–0.70, p=0.0017) and α-blockers (OR 5.94 CI 1.12–31.40, p=0.006) were independent predictors of functional recovery. Predictive logistic model showed an excellent fit: 80.4% sensibility, 79.5% specificity and 0.887 area under ROC curve.
Conclusions: The proportion of patients with AHF satisfying criteria for device implantation as a primary prevention, dropped significantly after 8 months on optimal medial treatment. Late gadolinium enhancement CMR is a useful tool to identify these patients. These data could help for selecting more timely and appropriately ICD candidates.

TREND OF CLINICAL CHARACTERISTICS OF PATIENTS ENROLLED IN THE ITALIAN ICD REGISTRY IN THE YEARS 2006-7 ON THE BASIS OF MAIN RANDOMIZED TRIALS

A. PROCLEMER[1], M. Ghidina[2], D. Facchin[1], L. Rebellato[1], P.M. Fioretti[1], M. Gulizia[3]

[1] Istituto Di Cardiologia-Azienda Ospedaliero Universitaria S. M. Misericordia, Udine, ITALY, [2] Fondazione Ircab-Azienda Ospedaliero Universitaria S. M. Misericordia, Udine, ITALY, [3] Istituto Di Cardiologia-Azienda Ospedaliero Universitaria S. M. Misericordia, Udine, ITALY, [4] Istituto Di Cardiologia-Azienda Ospedaliero Universitaria S. M. Misericordia, Udine, ITALY, [5] Istituto Di Cardiologia-Azienda Ospedaliero Universitaria S. M. Misericordia, Udine, ITALY, [6] U.O.C. Di Cardiologia-Ospedale Garibaldi-Nesima, Catania, ITALY

Background: Several trials demonstrated the life saving role of implantable cardioverter-defibrillator (ICD) in high-risk groups of patients. To evaluate the effects in clinical practice of the main published trials, we report the main epidemiological data of patients enrolled in the ICD Registry of the Italian Association of Arrhythmology and Cardiac Pacing in the years 2006–07.
Methods: The Registry collects prospectively 90% of national ICD implantation activity on the basis of European ICD form (EURID-EUCOMED), including the relevant clinical and instrumental data of the enrolled patients and the technical characteristics of implanted ICD.
Results: The number of implanted ICDs in Italy was 11.385 (78% first implants) in the year 2006, and 13,152 (77% first implants) in the year 2007. The number of ICDs per million of inhabitants was 192.5 in 2006 (+6.6% respect to 2005), and 220.6 in 2007 (+14.6% respect to 2006). The median age was 69 years in both years considered. The clinical data of patients treated with first ICD implant on the basis of inclusion criteria of the main published trials were:

	2006		2007	
AVID, CIDS, CASH	3173	(35.5%)	3299	(32.7%)
MADIT II	1083	(12.1%)	1119	(11.1%)
SCD-HefT	2592	(29.0%)	3063	(30.3%)
COMPANION	2122	(23.8%)	2542	(25.2%)
DEFINITE	1207	(13.5%)	1446	(14.3%)

Patients with overlapping inclusion criteria were considered in more than one main trial.
Conclusion: The ICD implantation rate in Italy increased significantly in the period 2006–7, similarly to the trend in other western countries. The Registry showed an important and continuous increase of prophylactic use of ICD according to recent publication of primary prevention trials (MADIT II, SCD-HefT, COMPANION, DEFINITE).

IMPLANTABLE CARDIOVERTER DEFIBRILLATOR IN THE PRIMARY AND SECONDARY PREVENTION SCENARIO. A SINGLE CENTER EXPERIENCE

V. MARIONA[1], J. Toquero Ramos[1], I. Fernandez Lozano[1], V. Castro Urda[1], J. Gonzalez Mirelis[2], L. Nombela Franco[2], L. Pulpon Rivera[2]

[1] Hospital Universitario Puerta De Hierro/Department Of Arrhythmia, Madrid, SPAIN, [2] Hospital Universitario Puerta De Hierro/Department Of Cardiology, Madrid, SPAIN

Introduction: The implantable cardioverter defibrillator (ICD) has consolidated as the best treatment to prevent sudden cardiac death in primary (PP) as in secondary prevention (SP) subsets. The evidence of its effectiveness is higher in patients with coronary artery disease (CAD) than the observed with nonischemic dilated cardiomyopathy (DCM). We analize our experience in 414 consecutive patients.
Results: Medium age was 60.6±11.6 years, 89.9% were male, average ejection fraction (EF) was 28.75±12. CAD was present in 67.5% and DCM in 32.5%. The indication for ICD implantation was PP in 171 (41.3%) and SP in 243 (58.7%) of patients. At implantation time, the patients´ NYHA functional status was class I in 11.8%, class II in 63.1%, class III in 24.3% and class IV in 0.5%. The patients received betablockers in 91% of cases, ACE inhibitors or ARBs in 90.1%, diuretics in 76%, statins in 72%, digoxin in 46% and spironolactone in 24%. A 22.7% had associated cardiac resynchronization therapy in their device. The mean follow up was 5.2±4.6 years. During this period, a 49% of SP patients received an ICD appropriate therapy, in comparison with 13.5% of the PP group (p<0.001). There were no significant differences with regard to the type of cardiopathy in the total group (32.9% with CAD vs 37.8% with DCM, p=0.32), neither in the PP subgroup (9,3% with CAD vs 18.7% with DCM, p=0,06). However, in the SP group, the need for an appropriate therapy was significantly higher in DCM patients (61.7% vs CAD 45.4% p=0,037).
Conclusion: In our ICD carrier patients, we found a higher frequency of arrhythmia in the SP group. Analyzing the clinical evolution according to the diagnosis, the patients with DCM have a greater arrhythmia relapse rate than the patients with CAD, with a non significant trend in the PP group.

Atrial Fibrillation: Clinical and Therapeutical Issues

IMPACT OF ATRIAL FIBRILLATION OCCURRENCE ON THE CLINICAL RESPONSE TO CRT DURING SHORT-TERM FOLLOW-UP: PRELIMINARY DATA FROM THE PRIMARY PREVENTION ACTION-HF REGISTRY

A. D'ONOFRIO[1], C.D. Dicandia[2], M.G. Bongiorni[3], R. Verlato[4], L. Santangelo[5], E. Marras[6], G. Belotti[7], E. Occhetta[8], L. Prato[9], G.L. Botto[10]

[1] A.O. Monaldi, Napoli, ITALY, [2] Casa di Cura Città di Lecce, Lecce, ITALY, [3] Ospedale Cisanello, Pisa, ITALY, [4] Ospedale P. Cosma, Camposampiero, ITALY, [5] Seconda Università di Napoli, Napoli, ITALY, [6] Ospedale S.Maria dei Battuti, Conegliano, ITALY, [7] Ospedale Treviglio Caravaggio, Treviglio, ITALY, [8] Ospedale Maggiore della Carità, Novara, ITALY, [9] Boston Scientific Italy, Milano, ITALY, [10] Ospedale S. Anna, Como, ITALY

Background: The relationship between atrial fibrillation (AF) occurrence after cardiac resynchronization therapy (CRT) and the clinical response to CRT is unknown.
Purpose of this study was to assess the correlation between AF occurrence and the clinical response to CRT in a group of consecutive patients implanted with a CRT device with defibrillator backup (CRT-D) enrolled in the prospective ACTION-HF registry.
Patient population and methods: Six months follow-up data were available for 228/416 enrolled patients. Baseline clinical characteristics were: age 69±8, NYHA functional Class I/II/III/IV= 2.2/25.2/69.5/3.1%, left ventricular ejection fraction 27±6%, heart failure (HF) symptoms duration 13.5±15 months.
AF occurrence, NYHA functional Class and the number of HF hospitalizations at six months follow-up were analyzed. Patients were considered clinical responders (ClRs) if their NYHA class improved of at least one point or they remained in stable Class II and they were completely free from HF hospitalization during follow-up.
Results: 34/228 (15%) pts had AF episodes during follow-up. New onset AF was observed in 19/34 (56%) pts whereas the remaining 15 pts had AF history. The ClRs were 70.6% in the overall patient population. There were fewer ClRs among patients with AF occurrences during follow-up than in patients without AF: 47% vs 74.7% (p=0.002).
ClRs were 11/19 (57%) among patients with new onset AF as compared with 5/15 (33.3%) among patients with both AF history and recurrences (p=NS). The absence of AF at 6-months follow-up was predictive of clinical response to CRT (OR 3.3, CI 1.54-7.18).
Conclusions: These preliminary data suggest that the incidence of AF during the first 6-months follow-up after the implant of a CRT-D device is about 15% and that the development of any AF is associated with a poorer clinical response to CRT.

THE ROLE OF CRT IN PREVENTION OF ATRIAL FIBRILLATION IN NON-ISCHEMIC DILATED CARDIOMYOPATHY

S. D'ASCIA, G. Santulli, V. Liguori, V Marino, C. Arturo, G. Persiano, M. Chiariello, C. D'Ascia

Dpt. of Clinical Medicine, Cardiovascular and Immunological Sciences; Federico II University, Naples, ITALY

Background: Cardiac resynchronization therapy (CRT) has emerged as a highly effective treatment for patients with advanced heart failure (HF) and ventricular conduction delay.
HF and atrial fibrillation (AF) often coexist and are believed to directly predispose to each other.
Aim: The object of the study is to assess the incidence of new-onset AF in HF patients treated with CRT and correlate AF events with clinical and instrumental parameters in responders and non-responders subgroups.
Methods: This is a single-center prospective study that included all consecutive non-ischaemic dilated cardiomyopathy patients underwent a CRT implant from May 2003 until April 2005; follow-up were planned every 6 months for 3 years. Following the elegibility criteria for CRT described in European guidelines, we enrolled 58 patients.
Non-responders were defined after 12 months of follow-up as patients with at least one of the following characteristics: deteriorating function (HF hospitalization, HF-related death or need for heart transplantation), increase in LVEF ±T 4 absolute percentage points, worsening in peak oxygen consumption, in QOL score or in the distance walked in 6 min.
Results: After 12 months follow-up 16 patients (28%) were considered non-responders, multivariate analysis indentified in left ventricular end diastolic diameter and in mitral regurgitation independent predictive factors for non-response to the CRT.
The most interesting finding is that, already after 1year, there is a significant (p<0.05) difference in new-onset AF in non-responder patients (18.2%) vs responders (3.3%). These data are confirmed and enforced at 2y (33.3% vs 12.2%) and 3y (50.0% vs 15.0) follow-up.
Conclusions: The present work confirms the clinical benefit of treating HF patients with CRT and suggest a possible favorable role of this non-pharmacological therapy, through means of an atrial reverse remodeling, on the AF prevention.

RIGHT VENTRICULAR LEAD POSITIONING DOES NOT INFLUENCE THE BENEFIT OF CARDIAC RESYNCHRONIZATION THERAPY IN PATIENTS WITH HEART FAILURE AND ATRIAL FIBRILLATION

F. RÖNN, T. Engström, M. Kesek, S.M. Jensen

Umeå University Hospital Department of Cardiology, Umeå, SWEDEN

Introduction: Little is known about the optimal right ventricular (RV) pacing site in resynchronisation therapy (CRT). This study compares bi-ventricular pacing using two different RV stimulation sites: RV-outflow-tract and left ventricular free wall (RVOT+LV) versus RV-apex and left ventricular free wall (RVA+LV).
Methods: 30 patients (29 males, 1 female) with chronic heart failure NYHA class III-IV, optimal drug therapy, QRS-duration±d150 ms and chronic atrial fibrillation received CRT with 2 leads in the apex (RVA) and outflow tract (RVOT) in addition to an LV lead, all connected to a bi-ventricular pacemaker (InSyncIII, Medtronic). Randomisation to pacing in RVOT+LV or RVA+LV was made 1 month after implantation and cross-over to the alternate pacing configuration after 3 months.
Results: Median age 69 year, mean QRS was 170ms and 60% had ischemic heart disease. Seven had pacemaker rhythm at inclusion and 60% were treated with AV-junctional ablation before randomisation. In the RVA+LV and RVOT+LV pacing mode 68% and 64% (ns) symptomatically responded with an improvement of at least 10 p in the Minnesota Living with Heart Failure score. The results including the primary end-point MLWHF are as follows:
Baseline (n=30): MLWHF 47±18, 6-min walk test (m) 343±94, VO2 max (l/min) 1.139±0.299, Pro-BNP 5362±4332.
RVOT+LV vs baseline, (n=27): MLWHF -17 (p<0.001), 6-min walk test (m) +44 (p<0.001), VO2 max (l/min) +0.117 (p=0.008), Pro-BNP -1055 (p=0.008).

RVA+LV vs baseline, (n=26): MLWHF -20 (p<0.001), 6-min walk test (m) +33 (p=0.002), VO2 max (l/min) +0.129 (p=0.005), Pro-BNP -1138(p=0.009).
RVOT+LV vs RVA+LV, (n=25): MLWHF -0.8 (ns), 6-min walk test (m) +0.3 (ns), VO2 max (l/min) -0.012 (ns), Pro-BNP -183 (ns).
Conclusion: In a randomised controlled fashion the exact RV pacing site; apex or outflow tract did not influence the beneficial effect of CRT in a group of patients with chronic heart failure and atrial fibrillation.

REPETITIVE ELECTRICAL CARDIOVERSIONS AND CARDIAC RESYNCHRONIZATION THERAPY IN HEART FAILURE PATIENTS WITH ATRIAL FIBRILLATION: THE SIBILLA STUDY

P. TURCO[1], F. Solimene[2], G. Stabile[3], A. De Simone[4], C. Cavallaro[5], A. Iuliano[3], N. Marrazzo[2], V. La Rocca[4], A. D' Onofrio[5]

[1] Hesperia Hospital, Modena, ITALY, [2] Casa di Cura Montevergine, Mercogliano (AV), ITALY, [3] Clinica Mediterranea, Napoli, ITALY, [4] Casa di Cura S.Michele, Maddaloni (CE), ITALY, [5] A.O.S. Monaldi, Napoli, ITALY

Background: Atrial fibrillation (AF) is a common supraventricular arrhythmia in heart failure (HF) patients. The AF incidence is related to the severity of clinical condition and could reach the 50% in NYHA IV functional class patients.
AF is associated with an increased risk of mortality, hospitalization and HF progression in patients with left ventricular systolic dysfunction. Cardiac resynchronisation therapy (CRT) can be beneficial in HF patients with concomitant AF in terms of improved symptoms, exercise capacity, systolic left ventricular function and mortality.
However very few data have reported a direct influence of CRT in restoring sinus rhythm (SR) and spontaneous reversion from AF to SR is a rare and unclear event.
Rationale and aim: Electrical cardioversion (EC), performed immediately or after few months the implantation of a CRT device, might help to restore SR in patients with persistent AF, even if only a low percentage of patients preserve SR during a mid-term follow-up (FU).
The aim of the study is to assess the efficacy of repetitive EC in restoring and preserve SR after 12 months, in CRT patients.
Study design. SIBILLA is a prospective, multi-center, single arm study with scheduled FU at 1, 3, 6 and 12 months. Patients with persistent AF (more than 6 months) and candidate to CRT with defibrillator backup are enrolled in the study.
The major exclusion criteria include patients with valvular disease and patients who underwent, or are indicated to undergo, an AF ablation procedure.
The primary endpoint is a reduction of 15% of AF recurrences between 6 and 12 months FU; the estimated sample size is 50 patients.
Conclusion: The SIBILLA study will assess the efficacy of repetitive EC and CRT in preserving SR in HF patients.

EFFICACY AND SAFETY OF A COMBINATION THERAPY WITH AMIODARONE AND FLECAINIDE IN THE PREVENTION OF ATRIAL FIBRILLATION

L. Santini, A. GIOMI, V. Romano, L.P. Papavasileiou, M. Sgueglia, A. Panella, L. Duro, A. Politano, R. Morgagni, L. Santucci, N. Terribili, G. Magliano, M. Borzi, G.B. Forleo, F. Romeo

Cardiology Department, Policlinico di Tor Vergata, Rome, ITALY

Background: Amiodarone is the most used drug to maintain sinus rhythm, but data report AF recurrence in 40% of patients at 1 year after electrical cardioversion and incidence of major side effects in 18% of patients treated with amiodarone. This study evaluates efficacy and safety of a combination therapy with amiodarone and flecainide in the prevention of AF recurrence after a successful electrical cardioversion, comparing with amiodarone given alone.
Methods: 40 patients have been retrospectively studied. All of them had persistent AF converted to sinus rhythm by ECV, preceded by pre-treatment with amiodarone. Amiodarone was followed in all patients after ECV. Flecainide was added in 20 patients while the other 20 patients continued the amiodarone alone. AF recurrence, ECG modifications, symptoms, Thyroid dysfunction, hospitalizations, Need for dose adjustment or for therapy suspension have been observed in the two groups at 1 week, 1, 3, 6 months and 1 year of follow up. Fisher exact test and tStudent test have been used. RESULTS. Results showed positive trend in patients receiving both drugs, with AF recurrence rate of 30% (6/20) in group A+F and 45% (9/20) in group A (P=NS), at 1 year after DCS. A larger distance between the group A and group A+F can be seen considering the total days passed in sinus rhythm: patients receiving amiodarone alone pass 61% of the days of the year in sinus rhythm vs 83% for those receiving A+F (p<0,001). Side effects incidence does not show considerable difference between two groups. Group A+F shows a greater ECG variations rate, mainly consisting in AV and IV conduction delays without any symptom neither indication for therapy suspension. No proarrhythmic complications have been reported during this study.
Conclusions: The combination of flecainide and amiodarone proved safe and with a longer time passed in sinus rhythm,compared to amiodarone alone.

CLINICAL AND ELECTROPHYSIOLOGICAL CHARACTERISTICS OF LATE AND VERY-LATE RECURRENT ATRIAL TACHYARRHYTHMIAS OCCURRING AFTER CATHETER ABLATION OF ATRIAL FIBRILLATION

G.B. FORLEO[1], L. Santini[1], M. Mantica[2], L.P. Papavasileiou[1], V. Romano[1], L. Duro[1], A. Panella[1], A. Politano[1], L. Santucci[1], G. Magliano[1], L. De Luca[1], M. Casella[2], A. Avella[2], A. Dello Russo[2], F. Romeo[1], C. Tondo[2]

[1] Department of Internal Medicine, Division of Cardiology, University of Tor Vergata, rome, ITALY, [2] Cardiac Arrhythmia and Heart Failure Research Center, St. Camillo-Forlanini Hospital, Catholic University of Sacred Hear, rome, ITALY

Introduction: Previous studies suggested that very late atrial tachyarrhythmias (AT) recurrence (≥12 months post-ablation) represent a unique patients cohort. However clinical predictors, electrophysiological findings and success rate after repeated ablation have not been described in detail.
Methods and Results: 337 consecutive patients (age 58.0±10.6 years, 215 men) who underwent PV isolation were retrospectively analyzed. After a single session of catheter ablation, 47 patients (13.9%) were found to have very late AT recurrence (Group 1) and were compared with 51 patients (15.1%) with late AT recurrence (2 to 12 months) who comprised the Group 2. We assessed the relationship between baseline variables and AT recurrences, additionally electrophysiological findings and clinical outcome of the repeated procedure were analysed.
Recurrent AT occurred after 25.4±9.7 and 6.7±3.1 months, in group 1 and in group 2, respectively. No significant independent predictor of late vs. very late recurrent AT was recognized. Although no statistically significant, recurrent organized left AT were more common in group 1 (52% vs 32.7%). A repeat procedure was performed in 18 patients (38%) of the Group 1 and in 25 patients (49%) of the Group 2. No significant differences were observed between groups in the recovered PV conduction rate and in the occurrence of conduction gaps across previously complete left atrial lines. Following 20.5 ±12.9 months of follow-up after the repeated procedure, by Kaplan Meyer analysis no significant difference was detected in the clinical outcomes.
Conclusions: Recovered PV conduction is a dominant finding in both groups. However, unpredictably no significant difference in clinical or electrophysiological findings was detected between groups.

IMPLANTABLE CARDIOVERTER DEFIBRILLATOR AND APPROPRIATE THERAPIES ACCORDING TO TYPE OF CARDIOPATHY

V. MARIONA[1], V. Castro Urda[1], I. Fernadez Lozano[1], J. Toquero Ramos[1], J. Gonzalez Mirelis[2], E. Sufrate Sorzano[2], L. Pulpon Rivera[2]

[1] Hospital Universitario Puerta De Hierro/Department Of Arrhythmia, Madrid, SPAIN, [2] Hospital Universitario Puerta De Hierro/Department Of Cardiology, Madrid, SPAIN

Introduction: The implantable cardioverter defibrillator (ICD) is the only treatment that reduces the risk of sudden cardiac death in the primary prevention (PP) subset. However, there are doubts about its efficacy with regard to the type of cardiopathy. We analyzed 72 (44.4%) patients with diagnosis of nonischemic dilated cardiomyopathy (DCM) and 90 (55.6%) patients with coronary artery disease (CAD) in whom an ICD was implanted with a PP indication.
Results: Patients with DCM had the same ejection fraction (EF%: 22.8±8.2 vs 24.7±8.7, p=0.098) and functional status (NYHA class: 2.4±0.6 vs 2.3±0.6, p=0.15), however, they were younger (age: 53.4±13.1 vs 61.3±8.8 p=0.001) and more frequently women (19.4% vs 3.3%, p=0.001). The DCM patients had a wider QRS (133.3±48.7 vs 114.2.±42.2 ms, p=0.15), although without statistical significance.
After a mean follow up of 2.35±1.6 years, 14 (19.4%) patients in the DCM group had an arrhythmia episode, in comparison with 9 (10%) of the patients in the CAD group (p=0.069). A total of 68 (42%) patients had associated cardiac resynchronization therapy (CRT) in their devices, 39 (57.4%) of them in the DCM group and 29 (42.6%) in the CAD group (p=0.004). Excluding those patients with CRT, 8 of 33 (24.2%) DCM patients had an arrhythmic event, in comparison with 8 of 61 (13.1%) of CAD patients (p=0.14). In the subgroup of patients who received an ICD with CRT, 6 de 39 (15.4%) patients in the DCM had an arrhythmia episode, comparatively with 1 of 29 (3.4%) in the CAD group.
Conclusion: In our PP population, the ICD efficacy is similar for the patients with CAD as is in the patients with DCM. There is a non significant trend to a higher incidence of arrhythmic events in patients with DCM.

HOW TO IDENTIFY DEPRESSIVE IMPLANTED CARDIOVERTER DEFIBRILLATOR RECIPIENTS WHO ARE AT THE GREATEST RISK OF VENTRICULAR ARRHYTHMIAS

L. DURO, G.B. Forleo, R. Leo, L.P. Papavasileiou, V. Romano, A. Politano, A. Panella, L. Santucci, G. Magliano, M. Sgueglia, A. Giomi, V. Brusca, R. Morgagni, M. Borzi, L. Santini, F. Romeo

Cardiology Department, Policlinico di Tor Vergata, Rome, ITALY

Introduction: Previous studies suggested that anxiety and depression in implanted cardioverter-defibrillator(ICD) patients is associated with adverse cardiac events. Aim of the study was to examine the association of emotional status after ICD implantation as measured by 3 different scales and subsequent arrhythmia events.
Methods and results: Fifty consecutive patients (age 69.5±11.0) who underwent ICD implantation in our institution were analysed. Arrhythmia events were measured by ICD device interrogation to obtain the number and type (defibrillation, cardioversion, and antitachycardia pacing) of therapies delivered. In addition treatment satisfaction and depression were analysed by 3 scales (BDI=Beck Depression Inventory; SCID=SCID-OP-DSM-IV; HAM-D=Hamilton Depression Scale) and the results were compared with respect to both arrhythmias recurrences and appropriate ICD treatment. After 29.4 months of follow-up 18 patients (36%) had significant ventricular arrhythmias recorded by the device and 6 appropriate ICD treatment occurred. The proportion of depressive patients as measured by the 3 scales was: 16% (HAM-D), 36% (BDI) and 28% (SCID). Differences in appropriate ICD treatment among the scales are reported in the table.
Conclusions: With the 3 scales, significant different results were found in our subjects. Our study suggests that the SCID scale correlate better with ICD therapy delivered. Despite several depression-scales are available, further research is needed in order to find the best way to measure depression in ICD patients. This may enable clinicians to identify ICD-recipients who are at the greatest risk and to intervene in the most harmful components of their depression.

CHARACTERISTICS OF FIRST ICD IMPLANTS IN A CHOHRT OF 478 CONSECUTIVE PATIENTS: PRELIMINARY DATA FROM THE SAFE-ICD STUDY IN COMPARISON TO ITALIAN ICD REGISTRY

A. PROCLEMER[1], D. Facchin[1], M. Brignole[2], A. Castro[3], C. Menozzi[4], G.Q. Villani[5], G. Spitali[6], G.P. Gelmini[7], M. Tritto[8], G. Raciti[9], A. Perucca[10]

[1] A.O. S.Maria della Misericordia, Udine, ITALY, [2] Ospedali del Tigullio, Lavagna, ITALY, [3] Osp. Sandro Pertini, Roma, ITALY, [4] Arcispedale S.M. Nuova, Reggio Emilia, ITALY, [5] Osp. Civile G. da Saliceto, Piacenza, ITALY, [6] Osp. S.M. delle Croci, Ravenna, ITALY, [7] A.O. Desenzano del Garda, Desenzano del Garda, ITALY, [8] Casa di Cura Mater Domini, Castellanza, ITALY, [9] Boston Scientific, Segrate, ITALY, [10] P.O. SS. Trinità, Borgomanero, ITALY

Background: Several registries have examined implantable cardioverter defibrillator (ICD) utilization trends in the era of primary prevention. Aim of the present analysis is to describe characteristics of consecutive ICD first implantations performed in year 2008 in 31 Italian centers participating to the SAFE-ICD (SAFEty of two strategies of ICD management at implantation) study and to compare them with 2007 data both in the same group of centers and in the entire set of 396 Italian centers participating to the Italian ICD registry (IIR).
Methods: In 31 Italian centres (SAFE-ICD study) 478 consecutive first implants of ICD were done between April and August 2008. The IIR collected 1329 first ICD implants in year 2007 in the same 31 centers and a total of 10094 implants in 396 centers in Italy. Coronary artery disease aetiology(CAD), age, ejection fraction(EF), NYHA class, resynchronization therapy device (CRT) and primary prevention (PP) were analyzed for SAFE ICD data, national IIR data for year 2007, and a IIR subset, containing the year 2007 data of the same centers participating to the SAFE-ICD study.
Results: 1) Characteristics in the IIR subset matched well IIR national data for year 2007 (CAD: 47%vs45%; age>70: 50%vs47%; EF<30: 52%vs49%; NYHA>II: 43%vs46%; PP: 57%vs54%; CRT: 35%vs38%; p=ns for all). 2) The SAFE-ICD data showed a significant increased proportion of only CRT and PP implants with respect to previous year data in the same centers; CRT: 45%vs35% (p<0.01); PP: 68%vs57% (p<0.01).
Conclusions: In a population of consecutive patients undergoing first ICD implantation in 31 Italian centers, primary prevention reached 68% of total implantations, showing an increased trend for prophylactic implants with respect to previous year data. Patient characteristics of the subset of centers participating to SAFE-ICD study match well data coming from national registry data. Further information on 2008 implants will be necessary to confirm these data.

PREVENTING SUDDEN CARDIAC DEATH WITH ICD'S. A UNIVARIETED LOGISTIC REGRESSION OF 14 FACTORS

L. PAPAVASILEIOU, M. Vellini, G.B. Forleo, L. Santini, A. Panella, K. Bellos, G. Magliano, M. Borzi, F. Romeo

Cardiology Department, University of Rome Tor Vergata, Rome, ITALY

Sudden cardiac death (SCA) is a leading cause of death in adults today. SCA accounts for almost 15% of all deaths. Many studies confirmed that ICD's are highly effective at saving lives of high risk patients, including those with left ventricular dysfunction.
Methods: We evaluated the 2 years clinical follow-up of 165 pts (140 men, 25 female) with implanted cardiac defibrillator (91 single chamber, 41 dual chamber, 33 CRT). The mean age was 66.1±12.87 yrs, the mean left ventricular ejection fraction was 28±12.6%. 101 pts (61.2%) were affected by ischemic heart disease. We performed 474 outpatients clinical follow-up. Patients were divided in two group (patient's with sustained VT's at follow-up, and pts that did not suffer by sustained VT's at follow-up). Univariate logistic regression and multiple logistic regression was performed.
Results: In 2 years follow-up 83/165 (50.3%) had non sustained ventricular tachycardia's, 40/165 (24.3%) sustained VT's, 24/165 (14.5%) received appropriate DC-shocks, 28/165 (17%) appropriate ATP treatment, 41/165 (25%) episodes of atrial fibrillation, 3/165 (1.8%) inappropriate DC-shocks, 5/165 (3%) infections and 10/165 (6%) of causes of malfunction. The univariete logistic regression showed that the use of b-blockers (p=0.074, 95% CI 0.94±4.19, odds ratio 1.98) and amiodarone (p=0.012, 95% CI 1.22±5.24, odds ratio 2.53), ATP's (p=0.000 95% CI 32.30±2053.51, odds ratio 257.4), DC-shocks (p=0.000, 95% CI 15.5±164.7, odds ratio 50,4) and infections (p=0.085, 95% CI 0.8±3098, odds ratio 4.99) were statistically significant. The multiple logistic regression showed that only ATP and DC-shocks were statistically significant.
Conclusions: More than one half of patients with ICD's have non sustained VT's and 25% of them sustained VT's. 17% receive treatment (ATP or Dc shocks). The use of b-blockers and amiodarone results to be statistically significant, while LVEF, non sustained VT's and AF do not correlate with treatment. Al last only 1.8% receive inappropriate shocks.

IDENTIFYING RISK FACTORS FOR INAPPROPRIATE THERAPIES IN ICD CARRIER PATIENTS

J. GONZALEZ MIRELIS[2], V. Castro Urda[1], J. Toquero Ramos[1], I. Fernandez Lozano[1], V. Mariona Montero[1], E. Sufrate Sorzano[2], L. Pulpon Rivera[2]

[1] Hospital Universitario Puerta De Hierro/Department Of Arrhythmia, Madrid, SPAIN, [2] Hospital Universitario Puerta De Hierro/Department Of Cardiology, Madrid, SPAIN

Introduction: Inappropriate therapy delivery (ITD) is a frequent complication in implantable cardioverter defibrillator (ICD) carrier patients. To know the type of patients in higher risk to receive an ITD is a matter of substantial importance. We conducted an analysis in 585 patients in whom an ICD was implanted to identify risk factors for an ITD.
Results: Mean age was 67.76±13.8 years. Coronary artery disease was present in 48.7% of patients, nonischemic dilated cardiomyopathy in 31.5%, electric disturbance type cardiomyopathy (EDC) in 8.2%, hypertrophic cardiomyopathy in 7.7% and arrhythmogenic right ventricular dysplasia in 1.8%. Primary prevention was the ICD indication in 45% of cases. Sinus rhythm was encountered in 83.9% of patients. Mean ejection fraction (EF) was 35.1±17.3%. Functional status according to New York Heart Association (NYHA) was, class I in 17.5% of cases, class II in 62.7%, class III in 13.7% and class IV in 6.1%. Mean QRS width was 120.9±38.4 ms. A 9.4% of patients suffered at least an ITD and the mean of ITD received was 0.9±10. In the univariate model, patients with ITD were encountered to have a higher EF (38.46 vs 34.51%, p 0.045), a shorter QRS width (110.5 vs 122.5 ms, p 0.05), higher rate of implantation for secondary prevention (SP 77.9% vs 50.9%, p<0.05), higher atrial fibrillation prevalence (24.4 vs 14.6%, p 0.023), better NYHA class (class I or II in 95.3% vs 74.1%, p<0.05) and a more frequent association with EDC (16.3% vs 6.8%, p 0.017). In the multivariate model, to have AF, EDC and be part of the SP group had a significant association with the probability to receive an ITD.
Conclusion: AF presence, to receive an ICD implantation for SP and to have an EDC was associated to a higher risk to suffer an ITD. A thoughtful ICD programmation is essential.

VERY LOW INCIDENCE OF ARRHYTHMIAS IN PATIENTS WITH ICD AFTER REPLACEMENT OF EXHAUSTED GENERATORS FOR PRIMARY PREVENTION

F. BISCIONE[1], A. Di Grazia[2], L. Pandolfo[3], A. Porzio[3], G. Altamura[1]

[1] Osp. S. Giacomo, Roma, ITALY, [2] Osp. Ferrarotto, Catania, ITALY, [3] Osp. S. Spirito, Roma, ITALY

The risk stratification of the pts candidates to ICD implantation is mandatory to correctly allocate the limited resources for the primary prevention of cardiac arrest.
Pts who not experience any arrhythmic event and reach the ICD End-of-Life (EOL) indicator could be at very low risk of cardiac arrest, and the implant of a new pulse generator can be questioned. We evaluate the incidence of arrhythmias recorded by ICD after replacement of exhausted pulse generators implanted for primary prevention without arrhythmic events recorded.
Patient population: 14 pts, 10 males, mean age 64 (range 32-81), 8 with ischemic cardiac disease, 7 with idiopathic dilated cardiomyopathy, 1 with hypertrophic cardiomyopathy, mean EF 0.32 (range 18-75), recipient of ICD after explantation of a previous pulse generator both for EOL indication or technical problems. None of these patients had experienced sustained ventricular arrhythmias in the whole life of the first ICD (35-62 months). 2/14 pts had inappropriate ICD activation during supraventricular arrhythmias.
Results: The arrhythmic records of the new generator were examined: 0/14 pts had sustained ventricular arrhythmias or arrhythmic events in a mean follow-up of 31 months (3-59). No complication was recorded in relation to the ICD replacement procedure.
Conclusions: the replacement of ICD in patients negatively monitored for a long time for primary prevention could be considered non attractive regarding the cost-effectiveness, in relation to the very low incidence of life-threatening cardiac arrhythmias and to the theoretical risk of complication related to the procedure.

Remote Control of Lead Integrity

PERFORMANCE OF RIATA ICD LEADS

K.H. KUCK[1], R. Corbisiero[2], S. Greenberg[3], G. Hindricks[4], O. Wazni[5], S. Beau[6], J. Porterfield[7]

[1] Asklepios Klinik St. Georg, Hamburg, GERMANY, [2] Deborah Heart and Lung Institute, Brown Mills, NJ, USA, [3] St. Francis Hospital, Roslyn, NY, USA, [4] Herzzentrum Leipzig, Leipzig, GERMANY, [5] Cleveland Clinic Foundation, Cleveland, OH, USA, [6] Arkansas Heart Hospital, Little Rock, AR, USA, [7] Methodist University Hospital, Memphis, TN, USA

Introduction: Recent attention has been focused on the performance of high voltage implantable cardiac defibrillator (ICD) leads. Lead-related adverse events (AEs) may be related to several factors including patient characteristics, concomitant therapies, implantation technique, and lead design. Few publications have included the number of patients (pts) and the follow-up duration necessary to accurately quantify lead performance and the incidence of lead-related AEs. This is a retrospective analysis which includes data on St. Jude Medical Riata family leads from 28 large implanting centers in the United States (US) and Germany.

Methods: Medical charts from pts implanted with Riata leads at 23 US (N = 12969 pts) and 5 German (N = 2418 pts) centers with a median follow-up of 13.5 months were reviewed to assess the incidence of lead-related AEs in patients implanted with a Riata lead. AEs were defined as those that required Riata lead revision, extraction, or replacement. This included conductor fracture, insulation damage, perforation and dislodgement.

Results: The sample is comprised of 15387 pts who received Riata leads before November 28th of 2007. Lead-related adverse event rates appear Tab. below.

Conclusions: The incidence of Riata lead related adverse events at 28 large implanting centers is at the low end of that reported in the literature for ICD leads and is consistent with previously reported Riata performance data. There were statistically significant differences ($p < 0.05$) in dislodgment and insulation damage rates between single and dual coil lead designs. However, there were no significant differences ($p > 0.05$ for each comparison) in AE rates between 7 and 8 Fr lead diameters, active vs passive fixation, integrated vs true bipolar or silicone vs Optim insulation lead models.

INITIAL EXPERIENCE WITH A NEW LOW ENERGY HIGH VOLTAGE LEAD INTEGRITY CHECK

J. SPERZEL[1], K. Seidl[2], W. Kranig[3], C. Butter[4], B. Lemke[5], A. Bauer[6], W. Daenschel[7], F. Gadler[8], F. Birkenhauer[9], A. Schaeken[9], G. Nölker[10]

[1] Kerckhoff-Klinik, Bad Nauheim, GERMANY, [2] Klinikum der Stadt Ludwigshafen, Ludwigshafen, GERMANY, [3] Schüchtermann Klinik, Bad Rothenfelde, GERMANY, [4] Herzzentrum, Bernau, GERMANY, [5] Klinikum Lüdenscheid, Lüdenscheid, GERMANY, [6] Universitätsklinikum, Heidelberg, GERMANY, [7] Herzkatheterlabor, Chemnitz, GERMANY, [8] Karolinska Institutet, Stockholm, SWEDEN, [9] St. Jude Medical, Brussels, BELGIUM, [10] Klinikum Coburg, Coburg, GERMANY

Introduction: Continued integrity of the high-voltage (HV) lead is essential for effective defibrillation therapy and patient safety. For verification, new devices offer a multi-vector high voltage lead integrity (HVLI) check, with measurements performed automatically on a daily basis using painless very low-energy stimulation.

Methods: For all patients participating in the St. Jude Medical clinical evaluation of Current ICDs and Promote CRT-Ds, we evaluated during implant and during follow-ups the HVLI measurement. At implant, the HVLI test was manually performed and compared to the actual Shock Impedance measured during defibrillation testing. During follow-ups, the HVLI test was performed to document the integrity of the lead and to document if the patient experienced any discomfort during the test.

Results: Of the 126 enrolled patients (88% M, 66.7 years), the HVLI test was manually performed at implant in 106 pts and resulted in a mean impedance of 41± 8 ohms. For 109 pts, the shock impedance measured during the HV testing procedure was available with a mean of 42±8 ohms. The correlation between the shock impedance measured during testing and the HVLI test performed as RV to SVC & can is 0.79 ($p<0.0001$). The mean for the HVLI test was 41±7 ohms (n=122) at predischarge and 45±8 ohms (n=99) at 3 month follow-up. At 3 months, the mean HV shock impedance measured during treated episodes was 46±3 ohms (n=2). During predischarge testing, 1 patient (0.79%) felt the HVLI stimulus and at 3 months 2 pts (1.59%) felt it. None of them experienced any discomfort.

Conclusion: HV lead impedance obtained using the HVLI check compared well with the HV shock impedance. No discomfort was observed during HVLI test. These measurements can be used for triggering a patient alert via the Patient-Notifier feature, so that clinical actions can be taken as early as possible.

	Lead Diameter		Fixation		Insulation Material		#of Coils		Polarity		Total
	8 Fr	7Fr	Active	Passive	Silicone	Optim	Single	Dual	Integrated	True	
N (%)	11605 (75)	3782 (25)	13576 (88)	1811 (12)	14413 (94)	974 (6)	1642 (11)	13745 (89)	1723 (11)	13664 (89)	15387 (100)
Fracture	0.22%	0.03%	0.15%	0.28%	0.17%	0.10%	0.30%	0.15%	0.06%	0.18%	0.18%
Insulation Damage	0.24%	0.08%	0.19%	0.28%	0.22%	0%	0.43%	0.17%*	0.12%	0.21%	0.21%
Perforation	0.33%	0.53%	0.43%	0%	0.37%	0.41%	0.49%	0.36%	0.35%	0.38%	0.38%
Dislodgement	0.86%	1.08%	0.96%	0.61%	0.88%	1.44%	2.19%	0.76%*	0.81%	0.93%	0.93%

*$p < 0.05$. All other comparisons were not statistically significant.

UNMASKING OF LEAD FAILURES IN A SMALL SCALED RIGHT VENTRICULAR DEFIBRILLATOR LEAD – REALITY OF SPRINT FIDELIS MEDICAL DEVICE RECALLS IN A SINGLE CENTRE

J. KREUZ[1], O. Balta[1], C. Pizarro[1], R. Fimmers[2], F. Mellert[3], A. Welz[3], G. Nickenig[1], J. Schwab[1]

[1] University of Bonn, Department of Medicine-Cardiology, Bonn, GERMANY, [2] University of Bonn, Department of Medical Biometry, Informatics and Epidemiology, Bonn, GERMANY, [3] University of Bonn, Department of Cardiac Surgery, Bonn, GERMANY

Introduction: Inadequate therapies of implantable cardioverter defibrillators (ICD) due to lead failure (LF) represent a grave problem in daily routine of any cardiologist. This publication illustrates a single centre experience with the Sprint Fidelis® lead (SF, Medtronic Inc.).
Methods: We analysed all 180 consecutive patients (pts) implanted with a SF (implantation from June 2005 - October 2007; follow up: 406±250 days). We screened for any abnormal lead measurement and apparent LF causing a surgical procedure.
Results: We identified 8 LF (4.4 % of pts) after an average of 17 months. 26 (15.1 %) pts of the analysed collective passed through a previous lead revision (no SF) but none of these pts currently suffered from a SF problem. 5 SF failures (63 %) became apparent by inadequate shock interventions. Statistical analysis revealed only one borderline significant result. None of the included pts under cardiac resynchronisation therapy (CRT) suffered from a LF, while 3 pts (4.3 %) of 73 single chamber devices and 5 pts (8.6 %) with dual chamber device (n=58) showed a LF (p=0.06). Furthermore, preliminary technical analysis indicates a weak spot at the pace-sense ring conductor as a major cause of LF.
Conclusion: We verified an increased error rate in pts with the SF lead. Nevertheless, considering the current data and recommendations of the DGK and HRS, it is not indicated to give a general reference to perform a prophylactic SF lead replacement. Each physician is asked to critically identify high risk pts (e.g. total AV nodal block, regular ventricular arrhythmia), in which such a procedure seems advisable. Creating a more stable lead technology and finally, the construction of a leadless ICD should remain the main task for the future.

REMOTE, WIRELESS, AMBULATORY MONITORING OF CARDIAC RESYNCHRONIZATION THERAPY SYSTEMS AND IMPLANTABLE CARDIOVERTER DEFIBRILLATORS

L. OTTAVIANO[1], V. Ducceschi[3], A. Borrelli[2], M. Aversa[1], V. Martino[1], G. Mascioli[2], R. Sangiuolo[1]

[1] Operative Unit of Cardiology and Cardiac Intensive Care Unit FatebeneFratelli Hospital, naples, ITALY, [2] Operative Unit of Electrophysiology and Cardiac Pacing Humanitas Gavazzeni Clinical Institute, bergamo, ITALY, [3] Department of Cardiology and Cardiac Intensive Care Unit S. Luca Hospital, Vallo della Lucania (SA), ITALY

Background: Patients with implantable cardioverter defibrillator (ICD),with cardiac resynchronization therapy (CRT-D) or not require additional non-scheduled visits to investigate symptoms that may or may not relate to their cardiac disease or device.Study Objective:To verify if the daily routine application of a new remote monitoring system in a population of CRT-D device and ICD recipients could reduce the necessity of additional non-scheduled visits to investigate symptoms that may or may not relate to the device.
Methods: Data transmitted daily and automatically by a wireless remote monitoring system (Home Monitoring (HM) – Biotronik GmbH&Co., Germany) were analyzed.The average time gained in the detection of events using HM versus standard practice and the impact of HM on physician workload were examined. The mean interval between device interrogations was used to compare the rates of follow-up visits versus that recommended in guidelines.
Results: 2055 transmissions were collected from 20 recipients of ICD (n=11) and CRT-D (n=9) implanted in our centre.On a total of 178 events collected by Home Monitoring: 78 (43.8%), were related to supraventricular tachycardia/fibrillation episodes, 69 (38.8%) to ventricular tachycardia/fibrillation episodes, 24 (13.5%) to CRT problems (low percentage of resynchronization,LV threshold increase,heart failure deterioration) and 7 (3.9%) to threshold increase in RA or RV. On average, 50% of the patients were event-free. The mean interval between follow-up visits in patients with ICDs and CRT-Ds were 5.9±1.9 and 3.9±1.1 months, respectively. The averaged time spent to check and evaluate the data supplied by HM was 32 min/week for the caregivers and 9 min/week for the cardiologist.
Conclusions: Application of remote monitoring provides frequent, convenient, safe and comprehensive follow-up of ICD and CRT-D devices. Device and patient related problems can be reliably and early detected, and its use may reduce the frequency of outpatient visits.

USEFULNESS OF CARELINK NETWORK IN PATIENTS WITH IMPLANTABLE AUTOMATIC DEFIBRILLATOR

S. IACOPINO, A. Talerico, G. Fabiano, P. Sorrenti, G. Campagna, G. Colangelo, R. Alemanni

Sant'Anna Hospital, Catanzaro, ITALY

Introduction: CareLink Network is a "virtual check-up" system which permits long-distance and real time examination of the cardiac condition in patients with an ICD, as well as routine check-ups similar to the outpatient medical examinations.
Object: To assess the usefulness of CareLink Network in a population of patients who underwent an ICD implantation.
Methods: The study was carried out in just one centre and it involved 50 patients (36 male patients, average age 57.1±19.3 years old) who underwent an ICD implantation, 42 (84%) with CRT. Each patient was taught how to carry out the interrogation and the transmission from his own home. Each transmission was followed by a telephone call to the patient.
Results: During the first six-month monitoring 64 transmissions were carried out successfully. The remote follow-up permitted a recording of atrial arrhythmias (8 AT/AF) in 2 patients, ventricular arrhythmias (94 SVT/NSVT) in 3 patients and 5 episodes of slow ventricular tachycardia in 2 patients, thus preventing admission to the accident and casualty ward in hospital or unscheduled visits. A reduced percentage of biventricular pacing (VP lower than 90%) was found in 8 patients. 36 alarm events because of possible fluid accumulation were recorded in 16 patients (positive predictive value 36/50=72%). As a consequence the prescribed therapy was optimized and hospital visits were prevented. Finally 6 appropriate defibrillator interventions (100%) were recorded for VF/VT in 3 patients.
Conclusions: CareLink Network is an effective system in the remote control management of patients with ICD. Its use led to a better and more effective management of the patients with advanced heart failure and let us plan possible follow-up visits only if necessary. Moreover, thanks to the timely notification of liquid accumulation, emergency visits in hospital were prevented, thus limiting the hospital expenses.

REMOTE CARE IN ICD FOLLOW-UP WITH THE HOUSECALL PLUS SYSTEM BETWEEN AN IMPLANTING CENTER AND ITS REFERRING CENTER

F. Briand[1], S. Fromentin[2], R. FOUCHÉ[2], J.P. Bassand[1]

[1] CHU Jean Minjoz, Besançon, FRANCE, [2] CH André Boulloche, Montbéliard, FRANCE

Purpose: Patients from the area of the Hospital of Montbéliard (MTBL) and indicated for ICD were so far implanted and followed-up 100 km away in the Hospital of Besançon (BSCN), the closest qualified center. We took advantage of St Jude Medical's trans-telephonic Remote Care system Housecall Plus to experience ICD follow-up (FU) in MTBL under control of BSCN. The aim of the study was to assess feasibility, efficacy and cost effectiveness of this technique.

Methods: A Housecall Plus Receiver was installed in BSCN and a Housecall Plus Transmitter in MTBL. Patients implanted with an ICD in BSCN were then followed-up in MTBL: interrogation and review were done with the Merlin programmer and seconds later by BSCN through the Housecall Plus system. BSCN could provide MTBL with its expertise by talking over the phone and when required, reprogramming was performed locally.

Results: After a series of 15 cases, MTBL had enough experience to perform ICD FU without assistance. All cases were quick and eventless, except 2 among the first ones (due to mishandling, we had to restart the system). Mean time of phone connection was 13±6min (1st one 24min, last one 6min). This includes trans-telephonic interrogation and review time of 8±4min (1st one 16min, last one 3min) and discussions between practitioners. For each FU, we saved 190±23km and 1h56±15min of travelling to patients, corresponding to a saving of 244±39 € for the healthcare system.

Conclusions: We demonstrated that the Housecall Plus system in such an "Implanting center to Referring center" pattern is easy to put in place and can be used routinely.

The distance separating our towns made this approach more compelling, generating major savings. As a training tool, this system went beyond our expectations: MTBL could quickly acquire the expertise in ICD FUs and consequently the corresponding burden was reduced in BSCN.

TRANSVENOUS LEADS EXTRACTION SYSTEM EVOLUTION – SINGLE CENTER EXPERIENCES

P. NEUZIL, L. Sediva, J. Petru, J. Skoda, M. Taborsky

Hospital Na Homolce, Prague, CZECH REPUBLIC

Objectives: Aim of this prospective single center study was to evaluate safety and efficacy of pacemaker and implantable defibrillator(ICD)lead extraction system Evolution(Cook Vascular Inc).
Background: Implanted leads are encapsulated by fibrotic tissue and standard transvenous removal technique becomes to be less effective and more risky.
Methods: As reference center 647 patients underwent transvenous lead extraction in our institution(884 pacemaker leads and 94 ICD leads)using transvenous contratraction method with PTFE sheats, radiofrequency current EDS sheats(Perfecta™)and "cutting"rotational system(Evolution™).The average time from the date of implantation to the extraction procedure was 66.2 ± 13.4 months.The most frequent indication for lead extraction was infection(97.8%).
Results: Complete extraction success rate in all leads indicated for extraction was 83%.Total number of 112 leads were extracted using RF only or in combination with standard PTFE ehats with success rate of 94% and 45 leads were extracted by rotational system Evolution™ and or with RF EDS sheats with success rate 97%.In some patients was used also femoral approach using snares and baskets to remove the rest of lead.Using Evolution lead extraction system wehaven´t documented any serious complication.
Conclusions: Based upon more than one year experiences we proved the new rotational lead extraction system Evolution™ as save technique which could be even more effective than RF supported EDS system.

INDICATIONS AND OUTCOME OF LASER LEAD EXTRACTION: A SINGLE CENTRE EXPERIENCE

P. Mazzone, P. VERGARA, N. Sora, A. Marzi, A. Pappone, M. Saviano, G. Augello, C. Pappone

San Raffaele Hospital - Department of Arrhythmology, Milano, ITALY

Cardiac lead extraction is a expanding procedure because of the actual high number of cardiac device implantations. Various methods have been traditionally used: manual traction, forceps-assisted manual traction, mechanical traction locking stylets assisted, open chest surgery.
Aim of the study: was to evaluate indications, effectiveness and complications of eccimer laser assisted leads extraction in a single center, single operator series of patients.
Methods and results: From december 2005 to september 2008 a total of 123 leads were removed in 63 patients. All leads implanted less than 6 months before extraction were not considered for analysis. Sixty-four leads were extracted by mechanical traction using locking stylets, 51 leads by eccimer laser extraction, 8 by open chest surgery (2 for laser extraction failure, 6 for the presence of large vegetations on the leads). Indication for extraction was infection in 36 (57.1%) pts, mechanical lead malfunction in 21 (33.3%) pts, device upgrade with previously abandoned leads in 4 (6.3%) pts, and the lack of the implant indication in 2 (3.2%) patients. Eccimer laser extraction was required in 41.0% atrial, 64.1% right ventricular (9 pacing leads, 25 defibrillation leads) and 3.2% coronary sinus lead. Complete leads removal was obtained in 61 patients. Pericardial tamponade occurred in 1 patient; there were no deaths.
Conclusion: Laser extraction has a high success rate and a low complication rate. Local and systemic infections are the most common indication to leads extraction. Laser extraction is frequently required for right ventricular ICD leads, while manual traction is usually sufficient for coronary sinus pacing leads.

PACING AND DEFIBRILLATOR LEAD EXTRACTION WITH LASER SHEAT: 5 YEARS OF A SINGLE CENTRE EXPERIENCE

A. Curnis[1], M. RACHELI[1], L. Bontempi[1], N. Pezzali[1], M. Cerini[1], C. Pagnoni[1], M.G. Latini[1], A. Lipari[1], M. Zaki[2], L. Dei Cas[1]

[1] Cardiology Departement Spedali Civli Of Brescia, Brescia, ITALY,
[2] Cardiology Departemt, El Cairo, EGYPT

Objectives: We describe the outcome of PM and ICD infections in patients referred to our centre who underwent to leads extraction with laser sheath.
Background: Malfunction, pocket erosion and infection are serious complications of PM and ICD implantation. Optimal care of patients with these cardiac device infections (CDI) and malfunction is not well defined
Methods: A retrospective review of patients with CDI and malfunction device between April 2003 and September 2008, was conducted.
Results: 153 pts met the criteria for CDI (106 pts; 40% with endocarditis, or sepsi and 60% with generator pocket infection) and malfunction (47pts). 292 pacing and defibrillator leads were extracted (36% atrial leads, 57% ventricular leads including 72 ICD leads (50 single coil) and 7% CS leads). Leads were implanted for 72±66 months. 92% were completely removed, 1% partially removed. 4 leads need cardiosurgical intervention to remove them.Leads implanted for <6 months could be removed with traction alone. Major perioperative complications were observed in 2 patients (tamponade for superior vena cava rupture and atrial subacute perforation in lead malfunction $p<0.05$ vs infection lead) and minor were seen in 3 patients (mild tamponade not requiring surgical intervention) and intraoperative ipotension due to intolerance to ionic contrast. The univariate analysis between different kind of leads (infected vs non-infected; icd vs pacing ; single vs double coil) shows no difference for outcome (except for time to fluoroscopy and procedure and fibrosis between pacing leads vs icd $p<0.002$). For CDI pts device replacement and surgical revision of the pocket are predictive of needing complete device and leads removal ($p<0.05$).
Conclusion: Lead extraction can be safely practiced with high success rates to physicians with implanted experience and major complications can be expected in <2 % of patients. Cure of CDI is achievable in the large majority of pts treated with complete device removal.

PERCUTANEOUS EXTRACTION OF ENDOCARDIAL LEADS IN 120 PATIENTS: PROBLEM, TECHNOLOGY AND POPULATION PRESENTATION

A. Kutarski[1], B. Malecka[2], P. Rucinski[3], A. Zabek[2]

[1] Departement of Cardiology Medical University, Lublin, POLAND,
[2] Departement of Electrocardiology of Jagiellonian University, Krakow, POLAND, [3] I Departement of Cardiology Medical University, Warsaw, POLAND

Pacing therapy, especially resynchronization therapies, pacing system upgrades and remaining inactive leads as well as prolonged life expectancy makes an increase of the number of electrodes in pace-

maker patients. Growing problem with endocardial leads infections and leads excess made the percutaneous lead removal technology widespread as the less invasive than cardiosurgery.
The aim: We present the statistics on the percutaneous lead removal in one reference centre in Poland.
Methods: Within the period of 2,5 years we removed 236 leads in 120 patients. The criteria to include to the analysis was the age of the oldest lead: 12 months in pacemaker patients and 6 months in ICD patients. All patients referred to the centre who had the indications to lead removal underwent percutaneous procedure. The age of the patients ranged from 18 to 87 (mean 65,7) years. The leads were removed by means of the Lead Extraction System (Cook) using the rotational cutting force only, not Laser or RF energy.
Results. Indications for the leads removal were: local (pocket) infection (47%), endocarditis (27%), lead excess (26%). Sixty percent of patients had at least two pacemaker/ICD interventions and 24% only one. The median time of the preceding procedure was 12 months. In 38 patients there were 60 inactive electrodes. Most patients had two (62%) or three (19%) leads and only 12% one lead or more than three leads (7%). In 28% of patient we removed leads from the coronary sinus.
Conclusions: Percutaneous lead removal procedures are performed in Poland in class I and II indications. In many cases patients had multiple leads, and also in coronary sinus. Most patients had the two or more interventions before.

ABRASION OF INTRACARDIAC LEADS IN ATRIOVENTRICULAR = DDD PACING SYSTEMS

A. KUTARSKI[1], B. Malecka[2]

[1] *Departement of Cardiology Medical University, Lublin, POLAND,*
[2] *Departement of Electrocardiology of Jagiellonian University, Krakow, POLAND*

Rising occurrence of infections and problems with abandoned leads stimulate the development of percutaneous lead removal techniques. Byrd dilators (Cook) enable extraction of the lead without accidental tube injury. From March 2006 to May 2008 we had extracted 135 rooted leads in 64 pts (35 M, 25 F) aged 18-86 years (mean age 64.6), with DDD systems (PM or ICD). We noticed old breaks in the insulation exposing the lead in its intracardiac course. Our goal was to estimate frequency and causes of abrasions and to this purpose every extracted lead was carefully inspected.
Results: Evident abrasions of one or more leads were observed in 24% of patients; old breaks in the insulation were difficult to determine in 17% of patients because of lead damage during the removal procedure. Abraded leads were mainly found in patients with infection (93%). Friction damage of the leads occurred mainly in the right atrium, rarely in the right ventricle. Permanent (2 or more years) physical contact and simultaneous intracardiac movement of the leads in various directions were necessary to result in abrasion.
Conclusions: 1. Repetitive long-term friction of leads in their intracardiac course may cause silicone abrasion. 2. Intracardiac lead abrasions may be related to lead endocarditis. 3. Intracardiac lead abrasion appears to be a new challenge to both lead constructors and implantors.

PACING AND DEFIBRILLATION LEAD EXCHANGE WITHOUT VEIN PUNCTURE

D. ANTONELLI, N.A. Freedberg, Y. Turgeman

Ha Emek Medical Center, AFULA, ISRAEL

Background: During lead implantation venous access is generally achieved puncturing Subclavian or Axillary Vein. Although rarely, after lead positioning, the lead must be changed because of its inadequate mechanical stability or poor pacing parameters.
A technique of lead exchange that avoids an additional vein puncture is reported.
Method: The tip of the lead, that has to be replaced, is retracted from the right atrium or ventricle into the Superior Vena Cava; the lead insulation is lanced along a few millimeters; the straight flexible tip of the guide wire is inserted between the insulation layer and the conductor of the lead. Then the lead is advanced, while the guide wire is driven in, until the tip of the guide wire is the Superior Vena Cava. At this point the tip of the guide wire, being gentle retracted from its position, is released in the vein lumen. Subsequently the lead is completely extracted from the vein but while maintaining the guide wire inside it. A dilator with a mounted peel-away sheath is advanced over the guide wire. The lead positioning follows in the usual manner.
Results: Three (2.4%) of the 125 implanted defibrillator leads and 12 (3.3%) of the 361 pacing leads were replaced. All the procedures were successful; their mean time was 2±1 minutes.
Conclusion: This technique is successful and safe in providing vein access using the previously implanted lead, thus avoiding the need to repeat puncturing a vein.

CONDUCTION DISEASE PROGRESSION IS HIGHLY PREVALENT IN DUAL CHAMBER PACEMAKER PATIENTS

F. AYALA PAREDES[1], F. Scazzuso[1], J.F. Roux[1], R. Nitzsche[2], M. Rigante[2]

[1] CHUS Universite de Sherbrooke, Sherbrooke, CANADA, [2] Sorin-ELA, Toronto, CANADA

Background: Sick sinus disease accounts for half of pacemaker (PM) implants and it was known that around 1% of patients (pts) per year could progress to complete AV block, making the idea of an atrial based single chamber PM highly attractive.
Methods: 22 pts implanted with a Symphony AAISafeR pacemaker (ELA, France) were followed, after the activation of the Safe R algorithm, for a median of 30 months after implant, and detailed information about AV conduction and switches to DDD/R was retrieved from the device at 6 or 12 months intervals. Results are expressed as mean percentages of AV block type at each visit.
Results: Mean age at implant was 71+/-8 years, and 56% of pts were men. All but two patients had no AV conduction known previous to the implant. Mean ventricular stimulation ranged from 0 to 1.2% and atrial stimulation from 41.8 to 43.5% after 30 months. As high as 37% of pts developed intermittent 1st degree AV block, 25% 2nd degree, and 13% 3rd AV block at long term (see table). Most of AV blocks needing a switch from AAI/R to DDD/R occurred during the day (67.1% versus 32.9% at night) but 60.9% of all blocks happened at rest and only 6.2% during exercise (precluding maybe symptoms).

Fup duration (months)	AVb1st (%)	AVb2nd (%)	AVb3rd (%)	Vpause (%)
3M	16	7	6	71
6M	12	24	17	46
12M	22	30	10	38
18M	25	38	11	26
24M	24	34	5	37
30M	37	25	13	25

Conclusion: As progression of AV conduction disturbances was seen for all type of blocks, it implies that most sick sinus patients could present higher and higher need of ventricular back up stimulation over the time, making the Safe R algorithm the most suitable to prevent unnecessary ventricular stimulation without compromising safety at long term basis.

CARDIAC CONDUCTION DISORDERS FOLLOWING PERCUTANEOUS AORTIC VALVE REPLACEMENT

E. PUZZANGARA, G.P. Pruiti, S. Conti, A. Di Grazia, G.P. Ussia, C. Tamburino, V. Calvi

Cardiology Department, Ferrarotto Hospital, Catania, ITALY

Purpose: Cardiac conduction disorders(CDs) are a common complication of surgical aortic valve replacement.Percutaneous aortic valve replacement(PAVR) is a new alternative therapy for patients at high surgical risk.We analyzed the incidence of CDs following PAVR requiring or not postoperative permanent pacemaker(PPM), in patients with severe aortic stenosis at high surgical risk.
Methods: Data were analyzed from 35 patients(mean age 81.8±8.5 years) undergoing PAVR from June 2007 to August 2008.The third generation of self-expanding CoreValve aortic valve prosthesis was the implanted device.The arrhythmic evaluation was made pre-procedure using basal ECG and Holter monitoring. The follow-up post-procedure was carried out using ECG at discharge and monthly and Holter monitoring after 1, 3 and 6 months.
Results: Before procedure 32 (91.4%)patients had sinus rhythm, 3 (8.6%)patients had atrial fibrillation and 5(14.3%) patients had previously implanted PPM. Left bundle branch block(LBBB) was documented in 1 (2.9%) patient; first degree atrioventricular block (AVB) was documented in 1 (2.9%) patient; right bundle branch block (RBBB) was documented in 5 (14.3%) patients, 2 (5.7%) of them presented a left anterior hemiblock (LAH) in association; isolated LAH was also documented in another (2.9%) patient. Within 24 hours after procedure new CDs occurred in 21 (60%) patients: RBBB in 1(2.9%)patient, LBBB in 12 (34.2%) patients, transient third degree AVB in 1 (2.9%) patient, irreversible third degree AVB in 7 (20%) patients. Before discharge new CDs occurred in other 4(11.4%) patients: LBBB in 2(5.7%)patients, irreversible third degree AVB in 2(5.7%)patients.8(22.8%)patients were treated with PPM. The incidence of third degree AVB and LBBB was 25.7% and 41.1% respectively. PAVR was successfully performed in 34 patients(97%).The overall mortality was 11.4%.
Conclusions: Our experience shows that CDs often occur after PAVR. The possible predictive factors for PPM after PAVR are unknown. Therefore other studies are necessary in order to attempt the decrease of CDs incidence.

NEW PREDICTORS OF EVOLUTION TO ATRIO-VENTRICULAR BLOCK IN PATIENTS WITH CHRONIC BIFASCICULAR BLOCK

J. MARTI-ALMOR[1], M. Cladellas, V. Bazan, C. Altaba, M. Matiello, M.A. Guijo, J. Bruguera

Hospital del Mar, Barcelona, SPAIN

Patients with chronic bifascicular block (BFB) can evolve to advanced atrio-ventricular block (AVB) over time, especially if syncope is present or a prolonged HV interval is registered during the electrophysiological study (EPS). Some others variables can help to predict the benefit of a prophylactic pacemaker (PM).
Aim: Evaluate the AVB evolution predictors in patients with BFB.
Methods: From 1998 to 2006 we've prospectively studied 263 patients with BFB. Clinical, electrocardiographic and electrophysiological variables were analyzed. To determine the need of a prophylactic PM the ESC guidelines were followed. All the PMs were programmed in VVI with a minimal rate of 40 beats/min. A double analysis was done looking for the presence of documented AVB during follow-up (FU) called real need (RN) for PM; also a theoretical need (TN) for PM adding the RN patients with patients who showed >10% of stimulation during FU. A transversal telephonic FU was performed in all patients in March 2007. Patients with associated carotid sinus hypersensibility were excluded.
Results: 249 patients were analyzed, mean age: 73.4±9.3 years. Male sex: 167 (67%). After a median FU of 54.46 [P25-P75] 26.94-76.94 months, we observed TN in 102 patients and RN in 57 patients. In a multivariate Cox regression analysis, the variables that predicted AVB in the TN model were presence of syncope, a QRS width >140ms, the presence of renal failure and the presence of a HV interval >64 ms in the EPS. In the RN model, the QRS width, presence of previous paroxysmal AVB, and the HV interval were independent factors, syncope or renal failure lost statistical significance. In both models a probability equation for each factor was done.
Conclusions: In our study the QRS width in both models is a new tool to determine the need for PM in patients with BFB.

SYNCOPE, ELECTROPHYSIOLOGICAL STUDY, AND PACEMAKER MEMORIES: WHEN DOES THE HV INTERVAL BECOME PATHOLOGICAL?

G. THEODORE[1], E. Cuvelier[1], Y. Guyomar[1], F. Coviaux[2], S. Heuls[1], P. Graux[1]

[1] *Hospital Saint Philibert, Lomme, FRANCE*
[2] *Armentieres Hospital, Armentieres, FRANCE*

Background: In patients with unexplained syncope and minor electrocardiographic abnormalities conduction, invasive electrophysiological study are usually performed. Despite that current guidelines recommend for permanent pacing a markedly prolonged HV interval greater or equal to 100ms in asymptomatic patients, there's some variance about the critical HV interval in symptomatic patient.
The aim of this monocentric prospective study was to assess the prognostic value of HV interval extension in symptomatic patients.
Methods: Patients with unexplained syncope or presyncope, minor electrocardiographic abnormalities without occurrence of significant paroxysmal A-V block during monitoring, underwent complete endocavitary exam. After exclusion of other syncope explanations, patients presenting isolated long HV interval over 70 ms were implanted with Sorin pace maker symphony 2550 in AAI SafeR (11 patiens) or talent DR (3 patients) with algorhythm's modification to preserve intrinsic ventricular conduction (DDI 50/min and a monitoring zone for ventricular pause until 3 seconds) in order to record significant paroxysmal A-V block. All high degree AV blocks events were assessed by pacemaker memory interrogation at 1, 3, 6, 12, 18, and 24 months.
Results: Between 2004 and 2007, 13 patients, 68 to 91 years old (mean 79 y) with unexplained syncope or pre-syncope, minor electrocardiographic abnormalities (1 incomplete LBBB, 1 RBBB, 4 LAFB, 8 RBBB +LFB), and isolated baseline HV interval between 70 and 86 ms (mean 76 ms) had pace maker implantation.
After a 12 months follow up, all patients were asymptomatic.
69 % (9 patients) experienced intermittent diurnal second or third degree AV block with ventricular pause over 3 seconds .
Conclusion: The combined use of modern pacemaker memories and electrophysiological data suggest that the "pathological" HV value could be shorter than 100ms in symptomatic patients. In our study, "minor" HV prolongations in symptomatic patients were associated with occurrence of intermittent high-degree AV block and no symptom recurrence.

RELATIVE IMPORTANCE OF THE AUTONOMIC NERVOUS SYSTEM ON THE CARDIAC ELECTROPHYSIOLOGIC EFFECTS OF REMIFENTANIL

J. ALMENDRAL[1], M.J. Anadon[2], M. Zaballos[2], C. Jimeno[1], B. Del Blanco[1], F. Atienza[1], D. Patino[1], E. Valdes[2], V. Uroz[2], J. Navia[1]

[1] *Hospital Gregorio Maranon, Madrid, SPAIN,* [2] *Universidad Complutense, Madrid, SPAIN*

It has been suggested, based on isolated case reports, that remifentanil can produce severe bradicardic accidents mediated by an intense vagotonic reaction.
Purpose: To evaluate the usual electrophysiologic effects of remifentanil.
Materials and methods: 15 large white pigs, previously anesthetized with propofol, underwent an electrophysiologic evaluation pre and post an infusion of "clinical" doses of remifentanil (bolus of 1 µg.kg-1, followed by an infusion of 0.5µg.kg-1.min-1). Femoral venous access was gained percutaneously. Five additional animals underwent electrophysiologic evaluation also during pharmacologic autonomic blockade.
Results: Remifentanil produced a significant increase on the sinus cycle length (SCL, 614±110 vs 734±165 ms, 21%, p=0.001), sinoatrial conduction time (SACT, 36±12 vs 50±24 ms, 40%, p=0.005), corrected sinus node recovery time (cSNRT, 142±66 vs 353±303 ms, 136%, p=0.001), Wenckebach nodal cycle length (WCL, 235±40 vs 280±94 ms, 20%, p=0.05) and ventricular effective refractory period (VERP, 255±38 vs 285±36 ms, 12%, p=0.004). There were no significant effects on pacing thresholds, atrial refractory period, paced QRS duration or QTc interval. Autonomic blockade produced a minor and non-significant decrease in SCL (833±103 vs 763±147 ms, 8%, p=NS), SACT (43±16 vs 44±14 ms, 0.5%, p=NS), cSNRT (366±273 vs 254±182 ms, 31%, p=NS), and a non-significant increase in WCL (307±22 vs 337±33 ms, 10%, p=NS) and VERP (300±39 vs 318±43 ms, 6%, p=NS).
Conclusions: Remifentanil produced important electrophysiologic effects in this closed-chest porcine model. The minor reversion observed by autonomic blockade suggests that remifentanil also exerted direct electrophysiologic effects.

CIPROFLOXACIN INDUCED QT INTERVAL PROLONGATION IN A PATIENT CHRONICALLY TREATED WITH SOTALOL: CASE REPORT

I. BERTOLOZZI[1], B. Rosaia[2], W. Corsini[3], L. Colombi[1], A. Pucci[1]

[1] *Cardiologia Ospedale di Carrara, Carrara, ITALY,* [2] *UO Medicina, Ospedale di Carrara, Carrara, ITALY,* [3] *UO Anestesia e Rianimazione, Ospedale di Carrara, Carrara, ITALY*

Background: Several antibiotics have been shown to prolong QT interval predisposing to torsade de pointes. Quinolones are able to block the rapid component of the delayed rectifier potassium current (Ik) causing QT interval prolongation. According to the available evidence the safest member of the class appears to be ciprofloxacin. In the present case report an elderly woman receiving long term medication with sotalol developed a marked QT interval prolongation and non sustained ventricular arrhythmias after oral administration of ciprofloxacin.
Case report: A 78 year old woman with history of implantation of bicameral pace maker (Medtronic ADAPTA ADDR01) for symptomatic sick sinus syndrome and previous episodes of atrial fibrillation was admitted in orthopedic for femoral neck fracture. His blood tests including potassium and magnesium were within normal limits except slightly elevated serum creatinine (1.5 mg/dl). An electrocardioqram on admission demonstrated atrial pacing 65 bpm (AAI) and QTc=360 msec. His chronic drug regimen included sotalol (80 mg/day), ACE inhibitors.
The day after admission she developed fever (38 °C) and lower urinary tract infection. Ciprofloxacin (2 x 500mg/daily) was orally administerd. The patient received 3 doses (1500 mg) of the antibiotic. Occasional ECG control revealed marked QT interval prolongation (QTc 635 msec). Ciprofloxacin and sotalol were immediately withdrawn. Telemetric PM interrogation did not reveal significant ventricular arrhythmias and the device was reprogrammed at higher lower rate AAIR/DDDR 80 bpm. Two days after ciprofloxacin withdrawn QTc gradually decreased to 400 msec.
Conclusion: ECG monitoring during initiation of quinolone treatment could be indicated in patients receiving concominant medications that prolong the QT interval.

DISTRIBUTION OF LATEST ACTIVATION SITE IN PATIENTS WITH DIFFERENT QRS CONFIGURATIONS UNDERGOING CARDIAC RESYNCHRONIZATION THERAPY

R. VAN BOMMEL, C. Ypenburg, V. Delgado, C. Borleffs, E. van der Wall, M. Schalij, J. Bax

Leiden University Medical Center, Leiden, THE NETHERLANDS

Purpose: Among the current inclusion criteria for cardiac resynchronization therapy (CRT) is a QRS duration >120 ms. Nonetheless, many patients with a prolonged QRS do not demonstrate mechanical left ventricular (LV) dyssynchrony. Furthermore, great discrepancies between electrical and mechanical dyssynchrony have been observed. To better understand the relationship between electrical and mechanical dyssynchrony, we investigated LV dyssynchrony with novel speckle-tracking analysis in patients with different QRS configurations, eligible for CRT.
Methods: Two hundred and forty-eight heart failure patients (191 male, ejection fraction 23+/-7%) undergoing CRT were included. Before device-implantation, 12 lead ECG and 2D echocardiogram was obtained. Patients were divided into five QRS configuration subgroups: narrow, left bundle branch block (LBBB), right bundle branch block (RBBB), intraventricular conduction delay (IVCD) and right ventricular (RV)-pacing. LV dyssynchrony was assessed using speckle-tracking radial strain analysis. Time of segment activation was defined as the time between QRS onset to peak radial strain, LV dyssynchrony as time between earliest and latest segment.
Results: Site of latest activation was predominantly located in the lateral (27%), posterior (26%) and inferior (20%) segments. An unequal distribution of LV segments with the most mechanical delay was observed in the LBBB and RV-pacing subgroups ($p<0.001$), while in the narrow, RBBB and IVCD subgroups, a more heterogeneous distribution was noted. Mean LV dyssynchrony in all patients was 186+/-122 ms and, more importantly, extent of LV dyssynchrony was comparable between the QRS configuration subgroups.
Conclusion: Presence of LV dyssynchrony can be observed in all QRS configurations. The lateral, posterior and inferior segments take up 73% of total latest segments. There is no difference in extent of LV dyssynchrony among different QRS configurations.

THE EFFECT OF LEFT VENTRICULAR PACING SITE ON CARDIAC RESYNCHRONIXATION THERAPY OUTCOME: THE RESULTS OF A PROSPECT SUBSTUDY

P.T. MORTENSEN[1], J. Herre[2], E. Chung[3], J. Bax[4], B. Gerritse[5], M. Kruijshoop[5], J. Murillo[2]

[1] Aarhus University Hospital (Skejby), Aarhus, DENMARK, [2] Sentara Norfolk General Hospital, Norfolk, USA, [3] The Christ Hospital, Ohio Heart And Vascular Center And The Lindner Clinical Trial Center, Cincinnati, USA, [4] Leiden University Medical Center, Leiden, THE NETHERLANDS, [5] Medtronic Bakken Research Center, Maastricht, THE NETHERLANDS

Purpose: This substudy of the PROSPECT study prospectively tested the influence of the anatomical left ventricular pacing site (LV-PS) on outcome of Cardiac Resynchronization Therapy (CRT).
Materials and methods: 426 patients (pts) with standard indications for CRT underwent echocardiographic and clinical evaluations before and after CRT implantation.
The LV-PS was determined using the Clockwise Principle (CP). This method expresses position projected on the mitral annular plane as a clock time (LAO view), and measures the distance from the mitral annular plane in centimeters (RAO view).
The LV-PS is grouped: between 12 and 2 o'clock and distance greater than 1/3 of heart size (group A, mid or apical anterior); between 3 and 5 o'clock and distance less than 2/3 of heart size (group C, basal or mid posterior); and all other (group B).
Trend results are based on Cochran-Mantel-Haenszel tests; survival results on unadjusted log-rank test.
Results: For 333 pts, followed for 0.9 years (mean), adequate images were available to define the LV-PS. LV-PS numbers in group A, B and C were 56, 159 and 118, respectively. Pts in group C were younger. The groups were statistically comparable regarding gender, etiology and NYHA class. Based on pre-defined analysis, trends were observed toward less improvement in LVEF, LVEDV, 6MHW and QOL in group A. Based on exploratory analysis, group A showed an increased total 1-year mortality compared to the other groups (16.4% vs 5.7% in C and 5.6% in B; comparison for A vs B+C gives $p=0.008$).
Conclusion: Anatomical LV-PS can be defined using the CP method. Mid or apical anterior LV-PS is significantly correlated with increased 1-year total mortality.

IMPACT OF RIGHT VENTRICULAR LEAD POSITION ON SIX MONTH NYHA CLASS IMPROVEMENTS IN PATIENTS UNDERGOING CARDIAC RESYNCHRONIZATION THERAPY

R. DUEHMKE, M. Dissanayake, F. Khan, M. Virdee

Papworth Hospital, Cambridge, UK

Introduction: A significant proportion of patients don't respond to cardiac resynchronization therapy (CRT), the reason for non-response is yet to be defined. Intraventricular dyssynchrony is commonly defined as the degree of incordination between the septal and lateral segments. Logic would suggest therefore that these two segments should be paced to achieve electrical and mechanical synchrony. We hypothesised that functional improvement in patients undergoing cardiac resynchronization therapy may be influenced by RV lead position.
Methods: We reviewed all patients who underwent CRT between July 2006 and March 2008. Patients included for analysis were in sinus rhythm, with severe LV impairment (EF<35%), significant functional limitation (NYHA Class 3 and 4) with evidence of intraventricular conduction delay (QRS duration >120ms). In total 54 patients were identified of which 27 had RV apical pacing leads (RVA group) and 27 had received RV septal leads (RVS group). NYHA class improvement at six months following CRT implant was used was used as the primary outcome measure.
Results: The baseline characteristics of both groups (RVA vs RVS) were not statistically different with regards to:

Age	(68.4 years ±10.1 vs 67.0 years ±9.60)
Gender	(77.8% male vs 74.1% male)
Aetiology	(59.3% ischaemic vs 66.7% ischaemic)
Pre NYHA Class	(3.30±0.46 vs 3.30 ±0.47)
QRS Duration	(164.8ms±34.6 vs 155.85ms±31.31)
ACE I	(96.3% vs 96.3%)
β-Blockers	(88.9% vs 81.5%)
Spironolactone	(70.4% vs 66.7%)
Diuretics	(88.9% vs 88.9%)
Digoxin	(11.1% vs 18.5%)

The mean NYHA class improvement after six months was greater in the septal group (1.37±0.93) than in the apical group (0.78±1.25), this difference was significant (p<0.03).
Conclusions: Clinical outcomes of CRT may be improved by RV septal rather than apical pacing. This observational study is limited by its retrospective nature, but suggests that prospective trials are needed to assess the role of septal pacing in the setting of CRT.

RELATIONSHIP BETWEEN NYHA CLASS CHANGE AND VENTRICULAR TACHYARRHYTHMIAS OCCURRENCE IN PATIENTS TREATED WITH CARDIAC RESYNCHRONIZATION PLUS DEFIBRILLATOR

A. LEPILLIER[1,2], O. Piot[1], B. Gerritse[3], X. Copie[1], T. Lavergne[2], O. Paziaud[1], G. Lascault[1], X. Waintraub[2], A. Otmani[2], J.Y. Le Heuzey[2]

[1]Centre Cardiologique du Nord, Saint-Denis, France
[2]Hopital Europeen Georges Pompidou, Paris, France
[3]Medtronic Bakken Research Center, Maastricht, THE NETHERLANDS

Aims: In patients with advanced heart failure (HF) and prolonged QRS interval, cardiac resynchronization therapy (CRT) reduces symptoms and the risk of death. The added benefit of an implantable cardioverter defibrillator (CRT-D) remains questionable in some patients.
Methods: In 332 HF pts treated with CRT-D (65±10 yrs, 86% men, NYHA class II 23%, class III 65% and class IV 11%, 70 % primary prevention, 55 % ischemic cardiomyopathy, LVEF 25±7.5 %, QRS width 167±32 ms), we evaluated the relationship between functional status change, death at 6-month follow-up (FU), and the occurrence of ventricular tachyarrhythmias (VT/VF).
Results: A total of 68 pts (20.5%) experienced 1 266 spontaneous episodes of VT/VF during FU. There was no difference in baseline characteristics between pts with or without VT/VF, except for ICD indication (primary or secondary prevention). Improvement in NYHA class during FU was significantly associated with a decreased occurrence of VT/VF (p=0.004). The 16 pts that died had significantly more often VT/VF than the survivors (50% vs 19%, p=0.007).
Conclusion: Within the initial 6 months post CRT therapy, 20% of patients received an appropriate ICD therapy. Responders to CRT have less VT/VF episodes than non-responders. Discriminant criteria for CRT response are awaited to optimize the choice of the device (CRT alone, defibrillator alone or CRT-D).

DECREASE OF PLASMA N-TERMINAL PRO-B-TYPE NATRIURETIC PEPTIDE PREDICTS CLINICAL IMPROVEMENT AFTER CARDIAC RESYNCHRONIZATION THERAPY FOR HEART FAILURE

L. DING[1], W. Xiong[2], W. Hua[1], K. Chen[1], S. Zhang[1], F. Wang[1], X. Chen[1]

[1] Fuwai Cardiovascular Hospital, Beijing, CHINA, [2] First Hospital of Tsinghua University, Beijing, CHINA

Background: Cardiac resynchronization therapy (CRT) is now an established treatment for advanced heart failure patients with ventricular dyssynchrony, but nonresponders have been observed. Because decrease in N-terminal pro-B-type natriuretic peptide (NT-proBNP) during pharmacotherapy for chronic heart failure (CHF) is associated with haemodynamic and clinical improvement, it may be helpful to assess the efficacy of CRT.
Methods: 40 patients with CHF (30 males, mean age 58±13 years, NYHA class 2.8±0.6, QRS duration 149±14 ms) who underwent successful implantation of a CRT system were included in this study. Pharmacotherapy remained stable during the first 3 months of follow-up. Plasma levels of NT-proBNP was evaluated before and 3 months after implantation. Clinical, echocardiographic and exercise parameters were monitored at each clinic visit after CRT implantation.
Results: After a mean 16.3±5.5 months of follow-up, 9 non-responders were identified (no improvement in NYHA class (n =8) and death due to progressive heart failure (n =1)). CRT resulted in a significant reduction in NT-proBNP (1697.8±1279.8 vs 1074.97±874.6 pg/ml, p <0.001) in responders.
However, there was not a significant change of NT-proBNP (1834.9±1159.9 vs 1782.4±1070.4 pg/ml, p=0.21) in nonresponders. A decrease in BNP level was a stronger predictor of long-term clinical improvement than clinical, echocardiographic and exercise parameters at 3 months of follow-up.
Conclusion: A decrease of plasma NT-proBNP levels from baseline to 3 months was a strong predictor of long-term response to CRT. NT-pro-BNP may be a simple method for monitoring the effects of CRT.

CHANGES OF INFLAMMATORY MARKERS AND NT-PROBNP IN HEART FAILURE PATIENTS WITH CARDIAC RESYNCHRONIZATION THERAPY

T. MINARIK, R. Dolecek, D. Brecka, K. Grussmannova, R. Stipal

University Hospital, Ostrava, CZECH REPUBLIC

Aim of the study: was to analyze changes of laboratory inflammatory markers and NT- proBNP on response of CRT in first three month after CRT implantation.
Methods: 42 patients (67.6±4.5 years, 32 pts male, 25 pts with ischemic CMP, 17 pts with non-ischemic CMP) with LBBB, NYHA functional class III. - IV., LVEF 21.7±7.5%, LVEDD 69.3±4.5mm underwent CRT implantation. Before CRT and 3 month after, clinical evaluation, echocardiographic and laboratory parameters were evaluated. We evaluated blood levels of aldosterone, estradiol, testosterone, cortisol, free T4, T3, TSH, plasmatic renin activity (PRA), interleukin 6 (Il-6), tumor necrosis factor alfa (TNF-α) and proBNP. Clinical responders to CRT were defined to NYHA definition (with reduction of functional class > or =1) and improvement of 6MWT.
Results: 12 pts (28.6%) were non-responders despite LVEF increase and LVEDD decrease (LVEF 21.6±4.7% vs 25.4±4.9%, p<0.05; in responders 22.1±5.3% vs 29.9±6.5%, p<0.001; LVEDD 70.2±6.1mm vs 67.0±4.7mm, p<0,05; in responders LVEDD 69.0±7.1mm vs 64.9±8.5mm, p<0.001). Changes in all plasmatic levels of aldosterone, estradiol, testosterone, cortisol, freeT4, T3, TSH, PRA were not significant (p=NS) before CRT and 3 month after. Blood levels of NT- proBNP were not significant (in non-responders p=0.17; in responders p=0.22). Values of TNF-á were significantly lower after 3 month in responders, but not in non-responders (in responders 11.5±4.7 ng/l vs 9.1±4.0 ng/l, p<0.01; in non-responders 12.7±3.6 ng/l vs 10.6±4.3 ng/l, p=NS). Plasmatic levels of Il-6 were singinficantly lower after 3 month in responders (responders 23.1±22.1 ng/l vs 4.5±2.8 ng/l, p<0.001; non-responders 20.5±12.8 ng/l vs 13.4±13.3 ng/l, p=NS).
Conclusions: 1/ Our preliminary results indicate singnificant changes of Il-6 in the response to CRT. If these changes could predict long term outcome of CRT pts, it should be proved on a larger group of pts. 2/ We did not prove significant influence of CRT on NT- proBNP levels in 3 month.

LONG-TERM PROGNOSTIC SIGNIFICANCE OF NON SUSTAINED VENTRICULAR TACHYCARDIA IN HEALTHY ATHLETES

E. LANARI, N. Sitta, P. Delise

S. Maria Dei Battuti Hospital, Conegliano Veneto, ITALY

Prognosis of non sustained ventricular tachycardia (NSVT) in healthy athletes during a long follow up period is unclear.
We studied 90 consecutive athletes (72 males), mean age 20±23 years (y) (6-43).
All athletes performed an ECG, an effort test, and an echocardiogram. Athletes with >3 premature ventricular beats (PVB), couplets and/or NSVT, discovered in pre-participation screening, performed a 24 hours holter (24h holter).
Exclusion criterias: structural heart disease and/or genetic cardiomyopathy; familiar history for juvenile sudden death (SD) and for genetic cardiomyopathy; sustained VT (SVT) and iterative VT from ventricular outflow tracts.
Subjects were divided in 2 groups:
A group; 72 athletes with PVB, but without NSVT
B group; 18 athletes with NSVT (with or without PVB).
In B group we recorded only 1 episode of NSVT in 24h holter; all of NSVT had a monomorphic morfology; mean beats n. 5,06; mean RR 389±61msec.
A and B group were subdivided into 3 categories by the number (n.) of PVB in 24h holter. Category (cat) 1, <100 PVB/24 h; cat. 2, 100-2000 PVB/24h; cat 3, >2001 PVB 24/h.
86/90 subjects (96%) had a complete follow up. During 8±5 y. follow up none of 86 athletes died nor there were cardiovascular events (SD, SVT or ventricular fibrillation). 69% continued sport, the others stopped. In A group, during 4.9±4 y. follow up, 10/46 athletes showed NSVT; In B group 2/12 athletes had NSVT in 3.6±3 y. follow-up. In the first Holter 61% (11/18) of B group athletes had few PVB (cat. 1) against 25% (18/72) of A group (p 0.008).
NSVT in healthy athletes has a benign prognosis. In our study: NSVT was sporadic, was monomorphic and was associated with few PVB in 24h. holter. There was no correlation between NSVT and sport activity.

USEFULNESS OF DYNAMIC SUBSTRATE MAPPING TO DIFFERENTIATE BETWEEN RIGHT VENTRICULAR OUTFLOW TRACT TACHYCARDIA AND ARRHYTHMOGENIC RIGHT VENTRICULAR DYSPLASIA IN ATHLETES

A. Colella[1], M. GIACCARDI[2], L. Caselli[3], C. Liccardi[1], G. Galanti[3], G.F. Gensini[1]

[1] Dept. Heart and Vessels-AOU Careggi, Firenze, ITALY, [2] Dept. Cardiovascular Rehabilitation, Don Gnocchi Foundation, Firenze, ITALY, [3] Agenzia Regionale Medicina dello Sport-AOU Careggi, Firenze, ITALY

Background: Radiofrequency catheter ablation (RFCA) of ventricular tachycardia (VT) is useful to eliminate arrhythmogenic substrate. Differentiation between the different right ventricular rhythm disorders and specifically between arrhythmogenic right ventricular dysplasia (ARVD) and right ventricular outflow tract (RVOT) tachycardias has important clinical implication but remains a clinical challenge. The aim of this study was to investigate the role of dynamic substrate mapping (DSM) do descrimate arrhythmogenic substrate and the role if RFCA to reduce arrhythmias.
Methods: In 10 patients (mean age, 26.1±12.37 years) with premature ventricular beats (VPB) or sustained (SVT) or non-sustained VT (NSVT) with left bundle block pattern with an inferior axis was performed a electrophysiologic and electroanatomic study.
The system (Array® St. Jude Medical) generate potentials and activation maps and an algorithm (DSM=Dinamic Substrate mapping) generate a map able to descriminate the zone of functional block around a zone o low potentials. After the study is possible to showed dysplastic regions only in 3 pts (AVRD group) and unaffected zones in 7 pts (RVOT group). RFCA was performed in all 10 pts.
Results: After 6 months of follow-up after a single ablation procedure, no patients in the two groups have SVT or NSVT (p<0.05). The VPB was reduced significantly (2532.30±3644.76 b/24hrs to 37.80±45.93; p<0.05). Electroanatomic voltage mapping in all the patients in AVRD group showed zone of low potential respect the RVOT patients (Unipolar: 3.47±0.31 vs 10.36±1.06, p<0.001; Bipolar: 0.67±0.15 vs 5.00±0.86, p<0.001). In this patients the DSM showing a functional block around the zone of lower potentials with a reentry mechanisms.
Conclusions: Electroanatomic voltage mapping and the analysis of substrate of right ventricle with DSM is able to identify VT due to AVRD by detecting RVOT scars and zone of functional block.

DIRECTED RAPID LEFT ATRIAL PACING FOR TERMINATION OF ATRIAL FLUTTER WITH TRANSESOPHAGEAL ELECTRO-ECHOCARDIOGRAPHY

M. HEINKE[1], B. Ismer[2], H. Kühnert[1], R. Surber[1], G.H. Von Knorre[2], T. Heinke[3], G. Dannberg[1], D. Prochnau[1], T. Pörner[1], M. Ferrari[1], H.R. Figulla[1]

[1] Department of Internal Medicine I, Cardiology Division, University of Jena, Jena, GERMANY, [2] Department of Internal Medicine, Cardiology Division, University of Rostock, Rostock, GERMANY, [3] Siemens AG Healthcare Sector, Rudolstadt, GERMANY

Purpose: After exclusion of atrial thrombus by transesophageal echocardiography (TEE), transesophageal atrial pacing (TAP) is established to terminate atrial flutter (AFL). Purpose of the study was to compare termination of AFL by directed TAP with and without simultaneous TEE, using a novel TEE hemispherical tube electrode.
Materials and methods: A total of 46 AFL patients (age 62±14 years; 17 females, 29 males) with mean AFL cycle length 238±45 ms (n=40) and mean ventricular cycle length 526±149 ms (n=35) (p<0.0001) were directed atrial paced either with an esophageal TO hemispherical electrode (n=32) or a novel TEE tube electrode (TO, TEE, Dr. Osypka GmbH, Reinfelden, Germany) with four hemispherical electrodes (6 mm diameter) that is pulled over the echo probe (n=14).
Results: Finite element simulation of the electrical field dipoles of novel hemispherical esophageal electrodes promised high-resolution bipolar transesophageal atrial (A) and ventricular (V) ECG (ESO) recording during AFL and SR. Applied in the patients, directed rapid TAP using the TO electrode resulted into atrial fibrillation (AF) (n=23), induction of AF with spontaneous conversion to sinus rhythm (SR) (n=5) and with conversion to SR (n=4). Directed rapid TAP using the TEE electrode (100%) resulted into AF (n=8), AF with spontaneous conversion to SR (n=4) and conversion to SR (n=2). Termination of AFL was possible with 300 to 1200/min TAP rate, 18 ± 6 mA output (from 10 to 30 mA) using 11 ±4 ms stimulus duration (from 10 to 20 ms).

Conclusion: AFL can be terminated by directed TAP with 300 to 1200/min pacing rate. Using hemispherical TEE tube electrodes, directed TAP is a safe, simple, and useful method to terminate of AFL during the mandatory TEE examination.

DOES SURFACE EKG DISCRIMINATE BETWEEN TYPICAL AND ATYPICAL ATRIAL FLUTTER?

G. BARBATO[1], V. Carinci[1], C. Tomasi[2], V. Frassineti[2], F. Pergolini[1]

[1] Cardiologia Ospedale Maggiore Bologna, Bologna, ITALY, [2] Cardiologia Ospedale S. Maria Delle Croci, Ravenna, ITALY

Background: Ablation of isthmus dependent atrial flutter (CTI-AFL) is safe and very successful. On the contrary the ablation of non CTI-AFL can be challenging, especially if the circuit is in the left atrium. Purpose of this study is to verify the reliability of the surface ECG to identify the mechanism of arrhythmia.
Methods: We reviewed the ECG of 208 consecutive pts that underwent catheter ablation of AFL between January 2004 and January 2008 (74% male, mean age 66.7±12 years). We considered typical ECG pattern the presence of F waves of opposite polarity in the inferior leads and in V1. We considered atypical ECG every other pattern.
Results: 148 of 208 patients (71%) had a CTI-AFL (group 1) while 60 patients (29%) had non CTI-AFL (group 2). The non CTI-AFL circuit was located in the left atrium in 24 cases (40%).
A typical ECG shows a specificity and sensibility of 0.83 and 0.73 to predict the presence of a CTI–AFL, with a positive predictive value of 88.5% and a negative predictive value of 63.9%. On the contrary we found a CTI-AFL in 36.2% of patients presenting with atypical ECG.
Conclusions: The typical AFL ECG is a best predictor of CTI-AFL (PPV 88.5%), then in the presence of a typical AFL ECG an ablation procedure can be safely suggested also in older patients. On the contrary an atypical AFL ECG doesn't rule out a CTI-AFL and an EPS should be considered.

EFFICACY AND SAFETY OF SEPTAL RIGHT VENTRICULAR OUTFLOW TRACT AS SITE FOR THE ICD LEAD: RESULTS OF THE PILOT PHASE OF THE EFFORT TRIAL

G. MASCIOLI[1], G.P. Gelmini[2], P. Pepi[3], V. Giudici[4], A. Spotti[5], E. Lucca[1], T. Bignotti[2], A. Reggiani[3], A. Locatelli[4]

[1] Cliniche Humanitas Gavazzeni, Bergamo, ITALY, [2] Azienda Ospedaliera Desenzano d/G, Desenzano d/G, ITALY, [3] Ospedale Carlo Poma, Mantova, ITALY, [4] Ospedale Bolognini, Seriate, ITALY, [5] Ospedale Civile, Cremona, ITALY

Pacing at the RV apex has always been used to pace and shock the RV in ICDs. In literature, we have been able to find out very few informations on alternative site for ICD leads and none of theme were derived from controlled study.
The EFFORT (EFFicacy Of Right ventricular outflow Tract for ICD leads) trial aimed to compare safety, efficacy and feasibility of RVOT and RVApex for the positioning of ICD leads. The primary end-point was a combined one and took into consideration: inefficacy of a 14J shock to convert induced VF, pacing threshold > 1V, fluoro time > 5 minutes and rate of dislodgement.
The pts were not randomized, but the site of lead positioning was left to the physician decision.
The pilot phase of the study enrolled 91 pts, 38 in the RVOT group (group A) and 53 in the apex group (group B). The 2 groups were homogeneous for age, gender, cardiopathy, ejection fraction and use of biventricular devices.
Pts in gr. A had a shorter - even if not statistically significant - fluoro time (3.2 ± 3.1 min. vs. 4.3 ± 3.1 min.), a lower R wave amplitude (11±6 mV vs 15±6 mV, $p<0.01$) and a higher pacing treshold at 0.5 msec (0.63±0.24 V vs.0.50 ± 0.18 V, $p<0.02$).
As far as the primary end-point is concerned, the primary end - point rate in gr. A was 29% (18% of inefficacy of 14J shock and 11% of fluoro - time > 5 minutes) and 40% in gr. B (19% inefficacy, 23% fluoro-time > 5 minutes and 2% dislodgement). The difference is not statistically significant ($p=0.20$).
To detect a significant difference of 10% with a 80% power, the study will enroll 180 pts in both arms.

PERMANENT LEFT VENTRICULAR PACING USING STANDARD BIPOLAR LEADS AS FOR BRADYCARDIA PACING: EXPERIENCE IN 26 PATIENTS WITH BRADYCARDIA INDICATION

Z. CALOVIC, S. Raspopovic, V. Jovanovic

Institute for Cardiovascular Disease, Belgade, SERBIA

Introduction: Although, left ventricular (LV) pacing provides better hemodynamic parameters than right ventricular (RV) pacing, it is not in common use for bradycardia pacing, because of complex implantation technique and duration of the procedure.
Aim: assessing the possibility of LV pacing by implantation of conventional pacing lead via transvenous approach into coronary sinus (CS) using usual operative technique for bradycardia pacemakers.
Material and methods: In 100 patients for VVI/DDD (R) implantation, we attempted to implant standard bipolar passive-fixation lead (58cm), as for RV pacing, trogh CS cannulation into a side branch of coronary veins and provide stable LV stimulation. No additional tools were used for CS cannulation. If pacing and sensing thresholds were satisfying (2,5V –0.4ms and 5 mV), pacing lead was left for permanent LV stimulation. In the case of indecisive threshold parameters or inability to enter the CS and/or to position the lead into CS in 10 minutes of fluoroscopy, or phrenic nerve stimulation the procedure was terminated as RV pacing. Electrical and safety date were obtained at implant, pre-discharge and up to 24 months post implant.
Results: In 66 patients we entered the CS trough simple lead manipulation. In 26 patients lead was left for chronic LV pacing, with threshold values < 2.5V. In 11 patients threshold was >2.5V, and in 3 patients because of phrenic nerve stimulation LV pacing was abandoned. In 40 patients it was not possible to position the lead into side branch. There were no complications entering the CS in any patients. During median follow-up of 13 months no lead dislodgement was observed, neither significant change in pacing parameters.
Conclusion: In vast number of patients it is possible to enter CS trough simple manipulation of conventional pacing lead. In valuable number of patients it is possible to obtain stabile permanent LV pacing.

THE IMPACT ON QUALITY OF LIFE SCORES IN PATIENTS IMPLANTED WITH DEFIBRILLATORS FOR PRIMARY PREVENTION OF SUDDEN CARDIAC DEATH

M. RUSSO[1], M. Santini[1], G. Boriani[2], G. Botto[3], M. Lunati[4], A. Proclemer[5], W. Rauhe[6], G. Vergara[7], S. Toscano[8], M. Merico[9]

[1] San Filippo Neri Hospital, Rome, ITALY, [2] Sant'Orsola Hospital, Bologna, ITALY, [3] Sant'Anna Hospital, Como, ITALY, [4] Niguarda Ca" Granda Hospital, Milano, ITALY, [5] Santa Maria della Misericordia Hospital, Udine, ITALY, [6] San Maurizio Hospital, Udine, ITALY, [7] Civile Hospital, Rovereto, ITALY, [8] L. Parodi Delfino Hospital, Colleferro, ITALY, [9] Medtronic Italy, Rome, ITALY

Purpose: To evaluate the impact of defibrillators (ICDs) implanted for primary prevention of sudden cardiac death (SCD) on physical and mental health of patients.
Materials and methods: 341 Italian patients enrolled in the SEARCH-MI registry completed the Medical Outcome Trust Short-Form (SF12) at baseline. 264 of them (77.4%) filled in the questionnaire also during a follow-up. Physical (PCS) and mental (MCS) component summaries of SF12 were analyzed regarding ICD implantation and shock received.
Results: For all subjects, baseline and last follow-up questionnaires were analyzed. Median follow-up period was 18 months (25°-75° percentile 9-26 months). Baseline PCS score was 41±10, while baseline MCS score was 47±10. After ICD implantation, the PCS score was 47±9 (p<0.0001 vs. baseline) and the MCS score was 51±10 (p<0.0001 vs. baseline). 35 patients (13.3%) experienced shocks: baseline PCS and MCS of this group were similar to those observed in patients without shock (PCS 41±10 vs. 41±10, p=0.859; MCS 45±11 vs. 47±10, p=0.540). During follow-up patients experiencing shocks and patients without ICD intervention showed an increase of both scores. In patients without shocks the relative increase was 14% for median PCS and 8% for median MCS whereas the relative increase of both scores in patients with shocks was 8% for PCS and 7% for MCS: the differences were not significant (p=0.431 for PCS, p=0.938 for MCS). In 26 patients who experienced a shock, questionnaires related to follow-ups with and without shocks were at disposal: PCS score between visits with and without therapies showed a tendency to improvement (43±10 vs. 46±8, p=0.062) while MCS score didn't change significantly (49±9 vs. 47±10, p=0.269).
Conclusion: ICD implantation for primary prevention of SCD increases PCS and MCS scores regardless ICD therapies. In the individual patient, after a shock, there was a trend of improvement in PCS without statistically significant changes in MCS.

EFFICACY AND SAFETY OF ANTI-TACHYCARDIA PACING THERAPY ON FAST VENTRICULAR TACHYARRHYTHMIAS IN EUROPE: THE ADVANCE-D TRIAL

M. LUNATI[1], M. Santini[2], P. Defaye[3], J. Mermi[4], B. Lemke[5], A. Proclemer[6], S. Del Castillo-Arrojo[7], X. Navarro[8], T. De Santo[9], E. Santi[9]

[1] A.O. Niguarda C`a Granda, Milan, ITALY, [2] San Filippo Neri Hospital,, Rome, ITALY, [3] University Hospital Michalon, Grenoble, FRANCE, [4] Klinikum Dortmund, Dortmund, GERMANY, [5] Klinikum Luedenscheid, Luedenscheid, GERMANY, [6] Az. Osp. S. Maria della Misericordia, Udine, ITALY, [7] Hospital Germans Trias i Pujol, Badalona, SPAIN, [8] Medtronic Spain, Barcelona, SPAIN, [9] Medtronic Italy, Rome, ITALY

The ADVANCE-D study aims to assess the efficacy of two ATP regimens in a large population of pts.
Methods: In this international, prospective, randomized, single blinded study, ICDs were programmed to detect FVT when 18/24 intervals were between 188-250 bpm. Pts were randomized to receive FVT therapy#1 as either ATP (8pulses burst at 88%CL) or ATP (15 pulses burst at 88%CL). Classification of spontaneous episodes, mortality and safety were adjudicated by an independent and blinded committee. The study goal was to estimate the efficacy differences between the two strategies to terminate FVTs.
Results: A total of 925pts (41.2% in primary prevention) were randomized to either 8p(N=475) or 15p(N=450). There were no baseline differences between randomized groups for % of primary prevention, gender, age, EF, HF history, or cardiac disease. A total of 2385 spontaneous ventricular episodes (324 pts) were adjudicated as follows: 1646 appropriately detected ventricular episodes (243 pts) were classified as 129VF (8%) in 38 pts, 467FVT (28%) in 110 pts, and 1050 VT (64%) in 160 pts. FVT occurred in 57/475 (12%) pts in the 8p group (250 episodes), and in 51/450 (11.3%) pts in the 15p group (209 episodes). Eight pulses ATP successfully terminated the 70.3% of FVT episodes (64.9% GEE adjusted) and 15p ATP the 72.2% (69.7% adjusted) with a mean difference in efficacy of 4.9% (p=0.504).
Acceleration was comparable in the groups (8p:10episodes(4.3%) in 7patients, 15p:8episodes(4%) in 6pts) and with no syncope. Syncope related to FVT was also similarly low(8p:1event (0.4%) in 1pts, 15p:5events (2.4%) in3pts, p=0.098 for pts; p=0.112 for episodes).
No difference in mortality:6.5% vs 5.8%,p=0.636.
Conclusion: In a large ICD population, the ADVANCE-D trial demonstrates the efficacy and safety of the ATP therapy on FVT episodes. On our population the 15p vs. 8p strategy is comparable in terms of efficacy and safety.

RESULTS FROM THE RELEVANT STUDY: SHOCKLESS PROGRAMMING IS SAFE AND EFFECTIVE IN PATIENTS WITH NON ISCHEMIC HEART FAILURE

A. PROCLEMER[1], G. Boriani[2], C. Menozzi[3], M. Landolina[4], S. Iacopino[5], F. Regoli[6], M. Biffi[2], E. Lombardo[7], A. Denaro[8], V. Burrone[8], A. Varbaro[8], M. Gasparini[6]

[1] A.O. Santa Maria della Misericordia, Udine, ITALY, [2] A.O.U. Policlinico Sant'Orsola Malpighi, Bologna, ITALY, [3] A.O. S. Maria Nuova, Reggio Emilia, ITALY, [4] IRCCS Policlinico San Matteo, Pavia, ITALY, [5] Villa Sant'Anna S.p.A., Catanzaro, ITALY, [6] Istituto Clinico Humanitas, Rozzano, ITALY, [7] Villa Maria Eleonora S.r.l., Palermo, ITALY, [8] Medtronic Italia S.p.A., Sesto San Giovanni, ITALY

Purpose: Pattern of ventricular tachyarrhythmia (VT) in Cardiac Resynchronization Therapy (CRT) patients with non-ischemic etiology and primary prevention ICD indication is still ill-defined. Part of these arrhythmias may be self terminating fast VT. The study investigated effectiveness and safety of shockless versus standard CRT-D device programming; shockless programming provides 30/40 VF NID detection, single burst ATP in fast-VT window, "monitor only" VT window.
Methods: Prospective, controlled, parallel, multicenter study with pre-defined treatment assignment for each center. Patients enrolled (n.324) were implanted with CRT-D devices between March 2004-September 2007: 164 patients received a shockless ICD programming (Protect group); the other 160 patients had a tailored ICD programming (Control group). Appropriate and inappropriate detections and therapies were computed; cardiovascular and syncopal events were compared between groups.

Results: No differences in baseline variables or follow-up (mean 14 months) were found between the groups. Analysis of detections showed that 90% of both ventricular and supraventricular tachyarrhythmias terminated within the 13-29 beat detection interval with the Protect algorithm. Protect group showed a significantly better event-free survival to first delivered therapy for all treated episodes (p=.0001), for appropriately treated episodes (p=.002), and for inappropriately treated episodes (p=.017). The total number of delivered shocks was significantly lower in Protect group (21 vs 57, p=.01). The long detection window used with Protect significantly reduced cardiovascular hospitalizations (HR 0.39, [0.17-0.90], p=.028) and did not increase syncope or death.
Conclusions: A shockless programming significantly and safely reduced overall ICD therapy burden and cardiovascular hospitalizations without entailing any additional adverse events in patients with non-ischemic HF and primary prevention ICD indication.

RIGHT VS BIVENTRICULAR ANTITACHYCARDIA PACING TO STOP VENTRICULAR TACHYARRHYTHMIA IN PATIENTS RECEIVING CARDIAC RESYNCHRONIZATION THERAPY: THE ADVANCE CRT-D TRIAL

J.O. SCHWAB[1], M. Gasparini[2], F. Anselme[3], J. Clementy[4], M. Santini[5], J. Martinez-Ferrer[6], M. Mainardis[7], T. De Santo[8], V. Burrone[9], E. Santi[8], B. Kaup[10]

[1] University of Bonn, Bonn, GERMANY, [2] Istituto Clinico Humanitas, Milan, ITALY, [3] University Hospital C. Nicolle, Rouen, FRANCE, [4] Hôpital Cardiologique du Haut-Leveque, Bordeaux, FRANCE, [5] S. Filippo Neri Hospital, Rome, ITALY, [6] Hospital Txagorritxu, Vitoria-Gasteiz, Álava, SPAIN, [7] Medtronic France, Paris, FRANCE, [8] Medtronic Italy, Rome, ITALY, [9] Medtronic Italy, Milan, ITALY, [10] Medtronic Germany, Dusseldorf, GERMANY

Little is known about antitachycardia pacing (ATP) success in heart failure (HF) patients (pts) treated with biventricular ICD (CRT-D). The aim of the ADVANCE CRT-D trial was to investigate the efficacy and safety of ATP delivered from right and left ventricle (BIV) vs. conventional right ventricular (RV) ATP.
Methods: This international, prospective, randomized, controlled, single-blinded trial considered pts implanted with a Medtronic CRT-D device based on conventional indications. Antitachycardia detections were programmed as follows: VF detection NID as 18/24 for ≥250 bpm; FVT via VF with NID 18/24 between 188-250 bpm; VT NID as 20 for ≥143 bpm. Randomization was 1:1 to either BiV or RV ATP (8 pulses, 88% coupling interval).
Results: 526 pts were randomized (BiV=260, RV=266) from February 2004. There were no significant baseline differences between groups. Efficacy of first ATP to terminate FVT+VT was comparable between groups (65% vs 69%, p=0.59). In VT zone, RV burst was slightly better (70% vs 62%, p=0.25), while in FVT zone BIV ATP was modestly more effective (71% vs. 61%, p=0.33). RV ATP was significantly less effective in ischemic compared to non-ischemic pts (81% vs. 59%, p=0.005). Syncopal/pre-syncopal events related to FVT never occurred for BiV while 4 events (3%) were observed in RV group (p=0.016). No difference in mortality was observed.
Conclusion: The ADVANCE CRT-D trial demonstrated for the first time that ATP was effective also for HF pts with a CRT-D device. No significant differences in efficacy were demonstrated between BIV vs RV delivered ATP in the total population. RV ATP was significantly less effective in ischemic than in non-ischemic patients, while BIV efficacy was comparable across different etiologies. BIV ATP showed a trend towards a superior safety profile. BIV ATP for FVT should be considered as first choice for pts with ischemic HF.

CAN INTRA-THORACIC IMPEDANCE MEASURED BY ICD DETECT THE VENTRICULAR REMODELING INDUCED BY CRT?

M. MAINES[1], M. Landolina[2], M. Lunati[3], G. Lonardi[4], A. Pappone[5], A. Proclemer[6], G. Zanotto[7], R.P. Ricci[8], A. Varbaro[9], J. Comisso[9], S. Valsecchi[9]

[1] Santa Maria del Carmine Hospital, Rovereto, ITALY, [2] IRCCS S. Matteo, Pavia, ITALY, [3] Niguarda Hospital, Milan, ITALY, [4] Mater Salutis Hospital, Legnago, ITALY, [5] IRCCS S. Raffaele, Milan, ITALY, [6] S. Maria della Misericordia Hospital, Udine, ITALY, [7] Civile Maggiore Hospital, Borgo Trento, Verona, ITALY, [8] San Filippo Neri Hospital, Roma, ITALY, [9] Medtronic Italy, Rome, ITALY

Purpose: Some modern implantable defibrillators (ICD) are able to monitor intra-thoracic impedance to detect pulmonary fluid overload. Assessment of intra-thoracic impedance is achieved by measuring impedance between the device case and the lead in the right ventricle. This vector encompasses both pulmonary and cardiac region. Therefore, besides possible pulmonary fluid accumulation, measured impedance depends on the amount of blood in the ventricular cavity. Considering that the measurements performed by the ICD are synchronous to the cardiac cycle, the intra-thoracic impedance is expected to change in response to changes in ventricular volume during follow-up. We hypothesized that the measurement system could detect the changes of ventricular volume observed during long-term cardiac resynchronization (CRT).
Methods: We analyzed echocardiographic and impedance data from 170 heart failure patients implanted with a CRT-D device capable of intra-thoracic impedance measurement for fluid accumulation diagnosis (InSync Sentry and Concerto, Medtronic Inc., Minneapolis, MN, USA).
Results: At 6-month follow-up, the median relative reduction of the left ventricular end-systolic volume (LVESV) was 15% in the overall population, with 127 patients showing a reduction of LVESV (LVESV at 6 month – LVESV at baseline <0: Group A). For the remaining 43 patients (Group B) the change was >=0.
Despite comparable values of impedance at baseline (Group A: 63±9ohm, Group B: 61±9ohm, p=0.262), the values were significantly different at 6 months (Group A: 74±10ohm, Group B: 68±9ohm, p=0.001) and 12 months (Group A: 76±11ohm, Group B: 69±9ohm, p=0.002).
Conclusions: These preliminary data collected in a large population of CRT-D patients seem to demonstrate that the intra-thoracic impedance measurement system permits to keep track of the changes of ventricular volume induced by CRT. Further studies are warranted to assess the accuracy of the measurement and to define the potential clinical application of the system.

ICD LONGEVITY: A COMPARISON AMONG MANUFACTURERS

M. BIFFI, M. Ziacchi, M. Bertini, D. Saporito, C. Valzania, G. Domenichini, C. Moschini, E. Cervi, C. Martignani, I. Diemberger, G. Boriani

Institute of Cardiology - S. Orsola-Malpighi Hospital - University of Bologna, Bologna, ITALY

Background: ICD longevity differs among different manufacturers, patients clinical characteristics and device release, so that comparison studies have never been reported.
We prospectively investigated overall longevity of devices implanted in years 2000, 2001, 2002 according to ICD type and manufacturers.
Methods: Longevity of single chamber (SC), double chamber (DC), and biventricular (BiV) ICDs from Medtronic (MDT), Guidant (GDT)

and St. Jude Medical (SJM) was measured in all the patients who reached device replacement. The observation follow up ended at December 31st 2007; patients prematurely dead or transplanted before battery exhaustion were excluded from the analysis. Independent predictors of longevity were detected by Cox proportional hazard regression model [type of ICD, manufacturer, maximum device output (=/< or >31J), arrhythmia storm (yes/no), amount of paced activity (=/< or >50%), number of delivered shocks per year divided into 4 subgroups (0, 1-2, 3-5, >5)].

Results: 163 patients received an ICD in the abovementioned period. Six underwent heart transplantation, and 23 died before device replacement; ninety had a SC device, 59 a DC device, and 14 a BiV device. At the end of the follow-up period, replacement rates were: 56/57 (97.2%) for SJM, 41/43 (95.3%) for GDT, and 10/24 (42%) for MDT (p=0.0001). Longevity was measured on 107/124 patients who had the ICD replaced.

At Cox regression analysis, only MDT manufacturer and SC type were associated with greater ICD longevity: the average number of shock/patient/year was low (<2) and not predictive of ICD replacement. The strength of ventricular pacing heavily affected longevity of CRT-Ds.

Conclusions: Battery longevity is significantly different among manufacturers. ICD cost is strictly dependent on device longevity, whereas device up-front cost is of limited clinical meaning. Appropriate assessment of cost-effectiveness should be based on ICD longevity in the real-life scenario.